

HOUSE OF LORDS

HOUSE OF LORDS

SESSION 2002–03

5th REPORT

SELECT COMMITTEE ON
SCIENCE AND TECHNOLOGY

SCIENCE & THE RDAs:
SETting the regional agenda

REPORT

Ordered to be printed 3 July 2003

PUBLISHED BY AUTHORITY OF THE HOUSE OF LORDS
LONDON – THE STATIONERY OFFICE LIMITED

£13.00

HL Paper 140-I

NA



HOUSE OF LORDS

SELECT COMMITTEE ON SCIENCE & TECHNOLOGY

RECENT REPORTS

Session 1998–99

- 1st Report Meeting with the Minister for Science
- 2nd Report Cannabis: Government Response* (*to 9th Report 1997–98*)
- 3rd Report Management of Nuclear Waste (*see also 1st Report 2001–02*)

Session 1999–2000

- 1st Report Non-Food Crops
- 2nd Report Meeting with Health and Science Ministers
- 3rd Report Science and Society (*see also 1st Report 2000–01*)
- 4th Report Non-Food Crops: Government Response (*to 1st Report 1999–2000*)
- 5th Report Air Travel and Health
- 6th Report Complementary and Alternative Medicine

Session 2000–01

- 1st Report Science in Schools (*follow up to Chapter 6 of 3rd Report 1999–2000 — see also 2nd Report 2001–02*)
- 2nd Report Therapeutic Uses of Cannabis (*follow up to 9th Report 1997–98*)
- 3rd Report Resistance to Antibiotics (*follow up to 7th Report 1997–98*)
- 4th Report Human Genetic Databases

Session 2001–02

- 1st Report Managing Radioactive Waste: the Government's consultation (*follow up to 3rd Report 1998–99*)
- 2nd Report Science in Schools: Government Responses (*to 1st Report 2000–01*)
- 3rd Report What on Earth? The threat to the science underpinning conservation (*follow up to 1st Report 1991–92*)

Session 2002–03

- 1st Report Managing Radioactive Waste: Government Response (*to 1st Report 2001–02*)
- 2nd Report Chips for Everything: Britain's opportunities in a key global market
- 3rd Report What on Earth? The threat to the science underpinning conservation: the Government's Response (*to 3rd Report 2001–02*) and the Committee's Commentary
- 4th Report Fighting Infection
- 5th Report Science & the RDAs: SETting the regional agenda

- LIBRARY
General Collections
P 6037
- Information about the House of Lords Select Committee on Science and Technology is available on www.parliament.uk/hlscience which also provides access to the texts of the above and earlier Reports.
 - General information about Parliament, the House of Lords and its other Select Committees may be found via www.parliament.uk



ritten response from the Government. When this is not published by the it as a further Report.

22501011696

HOUSE OF LORDS

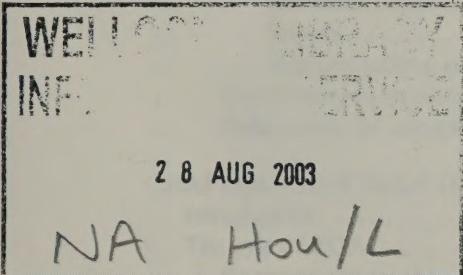
SESSION 2002–03

5th REPORT

SELECT COMMITTEE ON
SCIENCE AND TECHNOLOGY

SCIENCE & THE RDAs:
SETting the regional agenda

REPORT



Ordered to be printed 3 July 2003

PUBLISHED BY AUTHORITY OF THE HOUSE OF LORDS
LONDON – THE STATIONERY OFFICE LIMITED

£13.00

CONTENTS

	Paragraph	Page
CHAPTER 1: EXECUTIVE SUMMARY	7	
Overview of the Report.....	1.1	7
Science, Engineering & Technology in a modern economy	1.1	7
Our Inquiry	1.3	7
The main message	1.5	7
Recommendations	1.11	8
Coherence in SET exploitation.....	1.11(a)	8
RDAs' operational framework	1.11(e)	9
Metrics and bureaucracy.....	1.11(e)	9
Building capacity and confidence.....	1.11(i)	9
Other framework issues	1.11(k)	9
Supporting Business	1.11(m)	9
The exploitation gap	1.11(m)	9
Making connections.....	1.11(o)	9
Mobilising Universities' SET resources.....	1.11(q)	10
Conduct of the Inquiry	1.12	10
The Sub-Committee.....	1.12	10
Evidence	1.13	10
Complementary Reports	1.18	11
Abbreviations	1.19	11
CHAPTER 2: SETTING THE SCENE	12	
Introduction.....	2.1	12
The RDAs	2.4	12
Science and the economy	2.7	12
The common challenge	2.11	14
Policy approaches.....	2.14	14
SET demand and supply	2.18	15
Complexity in demand and supply.....	2.18	15
Demand.....	2.18	15
Supply	2.19	15
Interconnecting supply and demand	2.22	15
Complexity in exploitation	2.23	15
Addressing the complexity in public policy	2.25	15
CHAPTER 3: THE ROLE OF RDAs.....	17	
Introduction.....	3.1	17
The role of RDAs	3.4	17
Common approaches	3.6	18
Funding and leverage	3.7	18
SET and Business Sectors	3.11	19
SET and the Regional skill base.....	3.15	19
Wider Issues	3.16	20
Operating frameworks.....	3.19	20
Measuring success	3.21	20
Bureaucracy	3.30	22
Cooperative working between the RDAs	3.34	23
RDA Governance	3.38	23
Regional capacity building in SET	3.40	24
SET capability in RDAs	3.41	24
SET capability in the Regions	3.45	24
Science Councils	3.46	25

CHAPTER 4: THE DEMAND FOR SET	26	
Introduction.....	4.1	26
Demand issues.....	4.3	26
The complexity of the demand.....	4.5	26
Innovation Strategies for businesses	4.7	26
High-tech companies	4.10	27
Importance of Innovation	4.11	27
Supply chain links	4.13	27
RDAs and the Growth of High-Tech Industries	4.15	27
Funding the exploitation gap.....	4.17	28
Early stage financing	4.18	28
Second stage financing.....	4.20	29
The way forward	4.21	29
Less SET-dependent companies.....	4.24	29
SMEs.....	4.26	29
The role of intermediary technology institutes	4.29	30
National intermediary organisations.....	4.30	30
RDAs and Intermediary Institutes	4.32	30
Innovation Partnerships	4.35	31
University centres	4.36	31
Clarification of interconnections	4.37	31
Facilitating mechanisms.....	4.38	31
Support Schemes	4.39	32
Networks	4.43	32
Access to University expertise	4.48	33
Coordinated information	4.51	33
Public sector procurement.....	4.52	34
CHAPTER 5: THE SET BASE	35	
Introduction.....	5.1	35
The public sector SET base.....	5.3	35
Regional perspectives on the SET base	5.13	37
RDAs and SET investments	5.16	38
The HE White Paper and regional SET capacity	5.22	38
Economic gains from SET investment.....	5.28	39
Commercial Exploitation of Public Sector SET.....	5.29	39
Technology Transfer from Universities	5.32	40
HEROBAC, HEIF and "Third Leg" Funding	5.35	40
National Metrics for Knowledge Transfer	5.40	41
Commercial Activities of Universities	5.44	42
Intellectual Property Management	5.47	42
RDA/University relationships.....	5.50	42
Clusters.....	5.54	43
CHAPTER 6: RESETTING THE REGIONAL/NATIONAL BALANCE	44	
Introduction.....	6.1	44
Policy balances.....	6.3	44
National science investment.....	6.3	44
Investment in regional development	6.5	44
Exploitation of SET — the integrating agenda	6.6	44
Coherence	6.8	44
The developing role for RDAs.....	6.9	44
Regional/National coherence in SET	6.14	45
Coherent SET across Government Departments.....	6.18	46
RDA perspectives	6.21	46

Focus for coherence.....	6.23	46
Better integration of national and regional SET	6.25	47
National innovation framework.....	6.31	47
A National Framework for exploiting SET.....	6.33	48
Current approaches.....	6.34	48
Future directions.....	6.37	48
Conclusion	6.41	49
Box 1: The English Development Agencies.....		13
Box 2: The importance of SET.....		17
Box 3: RDA Budgets		18
Box 4: RDA Targets		21
Box 5: Regional R&D Spend by Source		36
Box 6: Regional GDP and R&D Spend — per capita		37
Appendix 1: Sub-Committee II.....		50
Appendix 2: Call for Evidence		51
Appendix 3: Witnesses		52
Appendix 4: Visit to Advantage West Midlands		54
Appendix 5: Visit to Scotland.....		57
Appendix 6: Visit to The Northwest Development Agency.....		62
Appendix 7: Visit to Wales.....		66
Appendix 8: Visit to The North East		70
Appendix 9: Abbreviation		73

Our findings

(1) Our Inquiry has looked at the way three independently run English Agencies – the Regional Development Agencies, the English Partnerships and the English Tourist Board – have developed their roles over time. The inquiry has also examined the relationship between the three agencies.

(2) These are difficult areas to highlight. They will be summarised in this section, but the full report will contain many more details of the work done by each agency and the issues they face. The inquiry has also been concerned with the role of the English Regions, and the extent to which they have been involved in the development of the English Agencies.

The wider message

(3) The main message of our Report is the need for coherent, joined-up government and economic planning. There is a clear role for setting up national priorities and targets, and for encouraging the co-operation of local government and the private sector in meeting those priorities.

Notes

- This document contains the Fifth Report in Session 2002–03 by the Select Committee appointed to consider Science and Technology. It was ordered to be printed on 3 July 2003, and published shortly thereafter.
- In the text of the Report, Q refers to a numbered question in the oral evidence and p refers to a page of written evidence, both as published in the second part of this Volume, HL Paper 140-II.

ORDERED TO REPORT:

SCIENCE & THE RDAs: SETting the regional agenda

CHAPTER 1: EXECUTIVE SUMMARY

OVERVIEW OF THE REPORT

Science, Engineering & Technology in a modern economy

- 1.1 The success of a modern economy turns crucially on its ability to innovate — to produce goods and services that prosper in increasingly competitive and global markets. Much of that innovation is technological. Either directly or indirectly, it involves the application and exploitation of Science, Engineering and Technology (SET), in which the UK has under-regarded strengths. With only 1% of the world's population, we carry out 4.5% of world science and publish 8% of science papers. Furthermore, UK scientists receive 10% of internationally-recognised science prizes¹.
- 1.2 The English structures for encouraging innovation as a driver of economic growth were substantially changed four years ago by the introduction of nine Regional Development Agencies (RDAs)². They have public funds of approaching £2 billion a year and mobilise substantial other resources for regional development. A number of their objectives — for example, in relation to innovation and skills — have a direct bearing on the country's SET base, while others (such as regeneration) can benefit from SET input.

Our Inquiry

- 1.3 Our Inquiry has looked at the way these comparatively young bodies interact with the SET base and the nature of their relationships, on SET-related matters, at both regional and national levels. As our wide-ranging Report and the detailed recommendations (for convenience, repeated below) show, this has proved a fertile area for study.
- 1.4 These are still early days for the RDAs. Even with the improvements we recommend, the lead-time on SET-related activities means that it will be some years yet before their full potential can be realised. Moreover, the context for their activities is still evolving. We are therefore minded to revisit the whole topic in, say, five years' time to examine the extent to which SET has been properly integrated into the regional agenda.

The main message

- 1.5 The main message of our Report is the need for coherence, longer term perspectives and reduced bureaucracy. There is a great deal of activity at regional, national and European levels encouraging the exploitation of SET for economic gain. The picture has become more complex with the establishment of the RDAs.

¹ Information from *Investing in Innovation: a strategy for science, engineering and technology*, July 2002 — text available on www.hm-treasury.gov.uk

² As noted in paragraph 2.5, this term is used throughout this Report also to include the separately established London Development Agency.

- 1.6 Our principal finding is the need for a rationalisation of all this activity to facilitate better SET exploitation. That rationalisation is about more than reducing the number of Government initiatives and general bureaucracy. The primary need is for a clear sense of national direction and purpose to create the conditions in which all stakeholders can make their optimal contributions. This will require better understanding of each other's roles, a common set of agreed outcomes and minimum bureaucracy.
- 1.7 It is for the Government to establish a structure and process by which this coherence can be achieved. Current accountability and targets for RDAs need to be revised to take account of the importance of SET in economic development strategies and to address the long-term nature of these activities.
- 1.8 Interrelationships with universities generally — and with the SET research base in particular — require a more strategic approach. Particular attention must be paid to applied or industrial research to facilitate the turning of SET discovery into world-class commercial products. This should relate to the business cluster and sector developments which are critical parts of RDAs' Regional Economic Strategies.
- 1.9 Much can also be done to improve the range and quality of SET-related information and, using modern web technology, simplify access to it. Regional Science and Industry Councils also have an important part to play in national/regional connectivity, and we urge their establishment in all regions.
- 1.10 The message can be summed up in five Cs — coherence, connectivity, coordination, communication and cooperation. Applying these to the exploitation of SET will improve the growth of regional economies, with consequent benefits for the nation as a whole.

RECOMMENDATIONS

- 1.11 We make various detailed recommendations (for emphasis, in bold type) at appropriate places throughout this Report. These recommendations are repeated below — for clarity, grouped together under appropriate headings. They appear in a different order from the main text, but each is followed by a note of the source paragraph.

Coherence in SET exploitation

- (a) We **recommend** that, as a priority, the Government should involve relevant national and regional players in devising and implementing — by the end of 2004 — a national policy and strategy for SET exploitation that, with a carefully tailored set of common outcome measures, truly integrates national and regional perspectives. (*Paragraph 6.38*)
- (b) We **recommend** that the Government should establish a forum for the Office of Science and Technology (including the Research Councils), RDAs and other key players, that meets regularly to address the impact of and synergy between national and regional SET investments and, as far as possible, harmonise them. (*Paragraph 5.26*)
- (c) We **recommend** that the Government should urgently publish the latest possible information about its R&D spend per region, and keep this up to date as a measure of its performance in supporting regional economies through nationally-provided SET. (*Paragraph 5.10*)
- (d) We **recommend** that, better to inform future policies on SET exploitation, the Department of Trade and Industry (DTI) should work with business, universities and RDAs to carry out an analysis of the complex issues in the demand for and supply of SET. (*Paragraph 2.28*)

RDAs' operational framework

Metrics and bureaucracy

- (e) We **recommend** that the Government should work with the RDAs urgently to develop simplified performance measures that take better account of SET's importance in economic development, and accommodate both realistic timescales for results and the differing circumstances of individual regions. (*Paragraph 3.28*)
- (f) We **recommend** that, in framing the revised performance measures, the Government and RDAs should consider success in attracting others' funding as a valuable indicator. (*Paragraph 3.29*)
- (g) We **recommend** that the Government should ensure that the revised performance measures contain incentives for cooperative working between RDAs. (*Paragraph 3.37*)
- (h) We **recommend** that the Government should reduce the bureaucratic load on RDAs and work with them to ensure that its guidance is reduced to the essential minimum and is, in any case, made consistent. (*Paragraph 3.33*)

Building capacity and confidence

- (i) We **recommend** that all RDAs should review their capabilities to ensure that they have sufficient operational knowledge and expertise to take SET initiatives forward. (*Paragraph 3.44*)
- (j) We **recommend** that all RDAs should have a regional Science Council or similar body and that RDAs should collaborate in assisting those Councils to network and make good connections with national SET and Innovation bodies and policies. (*Paragraph 3.51*)

Other framework issues

- (k) We **recommend** that, whatever the future hierarchy of regional responsibilities, the leadership of RDAs should remain with the business community. (*Paragraph 3.39*)
- (l) We **recommend** that all RDAs should explicitly address the development of SET skills and SET literacy in their FRESAs³. (*Paragraph 3.17*)

Supporting Business

The exploitation gap

- (m) We **recommend** that RDAs should collectively establish a small working party of officials and private sector financial advisers to draw up and propose to HM Treasury and DTI innovative solutions to funding the exploitation gap for early-stage financing of high-tech enterprises. Given the urgency of the needs, we suggest completion of the task by the end of October 2003. (*Paragraph 4.23*)
- (n) We **recommend** that DTI and RDAs should, in consultation with the providers and users of research, jointly ensure that means are available to identify and address gaps in the provision of applied and industrial research in relation to different SET-dependent sectors and clusters. (*Paragraph 4.37*)

Making connections

- (o) We **recommend** that RDAs work with the Small Business Service (SBS), Business Links, businesses, universities, Research Councils, charities and other relevant organisations to produce, publicise and keep up to date a web-supported intelligence service on SET support. (*Paragraph 4.51*)

³ Frameworks for Regional Education and Skills Action.

- (p) We recommend that the DTI should re-examine the case for arrangements like the USA's Small Company Set Aside Scheme to help small businesses to access and thus assist public sector procurement. (*Paragraph 4.57*)

Mobilising Universities' SET resources

- (q) We recommend that the Higher Education Funding Council for England (HEFCE) should work with the RDAs, the universities and other interested parties to develop strategic measures to assess the effectiveness of knowledge transfer and other interaction between universities and business, to complement the national quality measures for teaching and research. (*Paragraph 5.43*)
- (r) We recommend that each RDA should work with its regional university association to devise and put in place arrangements for closer strategic working that also minimise the bureaucracy of contracting arrangements. (*Paragraph 5.53*)
- (s) We recommend that RDAs should collaborate with their regional university associations to map the strengths of the universities (in teaching, research and knowledge transfer) in relation to key clusters, aggregating the results into a national resource by making them available on the recommended⁴ web-enabled intelligence service. (*Paragraph 5.57*)

CONDUCT OF THE INQUIRY

The Sub-Committee

- 1.12 The Inquiry was conducted by Sub-Committee II, which also prepared this Report. The Sub-Committee membership and declarations on interest relevant to the Inquiry are set out in Appendix 1. Our Specialist Adviser was Dr Marilyn Wedgwood FRSA, Pro-Vice-Chancellor and Director of External Relations at Manchester Metropolitan University⁵. We are grateful for her help in working through the many inter-related strands of this Inquiry.

Evidence

- 1.13 The Inquiry was formally launched in January 2003 with the Call for Evidence reproduced in Appendix 2. We received evidence from a wide range of sources, listed in Appendix 3. The written evidence was complemented by oral evidence at eight public hearings between late February and early April. The oral and written evidence is published in Volume II of this Report.

- 1.14 To help understand the way that Development Agencies worked with their regional partners, we made several visits in early 2003 to English RDAs (the focus of our Inquiry) and, for comparison, to their longer-established sister organisations in Scotland and Wales, namely:

- Advantage West Midlands in Birmingham on 29 January;
- Scottish Enterprise in Glasgow and Edinburgh on 6 and 7 February;
- the NorthWest Development Agency in Macclesfield on 11 February;
- the Welsh Development Agency in Cardiff and Swansea on 17 February; and
- One NorthEast in Newcastle Upon Tyne on 20 March⁶.

Brief reports of these visits are in Appendices 4 to 8. As noted there, many of those we visited also provided formal written and oral evidence.

⁴ See paragraphs 1.11(o) and 4.51.

⁵ Fuller details in Appendix 1.

⁶ The Sub-Committee remained in Newcastle on 21 March for one of the public hearings mentioned in paragraph 1.13, see page 159 of Volume II.

- 1.15 We are most grateful to all those who gave evidence, and to our generous hosts and others involved in the various visits, for the contribution of their time and knowledge to our deliberations.
- 1.16 Volume II, coupled with Appendices 4 to 8 in this Volume, represents a substantially larger body of evidence than we expected when launching the Inquiry. We have benefited enormously from all the material submitted, and would draw particular attention to:
- the helpful material from the longer-established Development Agencies in Scotland (p⁷ 312), Wales (p 341) and Northern Ireland (p 288); and
 - the valuable perspective (notwithstanding their different traditions and cultures) of other countries' approaches to the same issues, as set out in the submissions from the British Embassies in France, Germany, Canada, the United States of America and Japan (pp 250–266), and in the material from Enterprise Ireland (p 220 and QQ⁸ 366–386).
- 1.17 Keeping this Report to a reasonable length has made it impossible to make the usual full references to all that evidence. With the pointers given in the body of the Report, however, we hope that Volume II will provide a valuable resource for the Government, RDAs and others as they develop their policies and practices in the light of our recommendations.

COMPLEMENTARY REPORTS

- 1.18 This Report concerns RDAs' interactions with the SET base. Complementary aspects of RDAs' operations have been or will be reported on by other Select Committees in the light of the following studies:
- the impact of RDAs on regional disparities — by the House of Commons ODPM⁹ Committee as part of its investigation of the ODPM target to reduce the gap in growth rates between regions, which reported¹⁰ in early July 2003;
 - the interaction between Higher Education Institutions and RDAs — by the House of Commons Education and Skills Committee as part of its study of the proposals in the White Paper *The Future of Higher Education*¹¹, due to report in the second half of 2003; and
 - RDAs' role in the provision of support to industries and businesses — by the House of Commons Trade and Industry Committee, due to report in Autumn 2003.

ABBREVIATIONS

- 1.19 Abbreviations are generally explained only the first time they are used. For convenience, they are all listed in Appendix 9.

⁷ Throughout this Report, p refers to a page number of written evidence in Volume II.

⁸ Throughout this Report, Q refers to a question number of oral evidence in Volume II.

⁹ Office of the Deputy Prime Minister.

¹⁰ *Reducing Regional Disparities in Prosperity*, 9th Report Session 2002–03, HC Paper 492.

¹¹ Cm 5735, January 2003.

CHAPTER 2: SETTING THE SCENE

INTRODUCTION

- 2.1 Our Inquiry has been into the ways that English Regional Development Agencies interact with the SET base. This Chapter sets the scene for the remainder of the Report by:
- introducing the RDAs;
 - discussing the relationship between SET and the economy; and
 - outlining the challenges and opportunities posed by the emerging English national and regional structures.
- 2.2 Subsequent Chapters explore the challenges in more detail.
- Chapter 3 discusses the particular challenges for RDAs with their remit to develop their regions' economies.
 - Chapter 4 considers the exploitation of SET from the business or "demand" perspective.
 - Chapter 5 looks at the same questions from the complementary SET base "supply" perspective.
 - Finally, Chapter 6 takes account of these different perspectives and examines the new dynamics between national and regional approaches to the application and exploitation of the SET base.
- 2.3 Underpinning all this is the certainty that, in a modern economy, turning SET discovery and invention into marketable products and services is vital for international competitiveness and thus wealth creation and economic growth.

THE RDAs

- 2.4 England has nine Development Agencies, one for each of the areas adopted for other regional purposes, as listed in Box 1.
- 2.5 Strictly speaking, only the eight bodies established under the *Regional Development Agencies Act 1998* are "Regional Development Agencies". The ninth, the London Development Agency (LDA), was established separately, under the *Greater London Authority Act 1999*. For most purposes, however, the RDAs and the LDA can be treated as similar bodies. For simplicity, we have used "RDAs" throughout this Report to include the LDA unless specifically mentioned otherwise.
- 2.6 These public sector bodies¹² were set up to develop and pursue Regional Economic Strategies in conjunction with their regional partners. The overall aims are to increase regional Gross Domestic Product (GDP) and reduce regional disparities.

SCIENCE AND THE ECONOMY

- 2.7 A key component of RDAs' Regional Economic Strategies is technological innovation — that is, the application and exploitation of the SET base. SET's economic impact comes from the translation of scientific discovery into commercial products and services. The products are various and have different contributions to make, both direct and indirect, to regional economies. These range from the competitiveness of an individual company to the incorporation of new technologies into a region's

¹² RDAs are not, however, typical public sector bodies. As discussed in paragraph 3.38, they are governed by business-led boards. Their staff are not civil servants, but employed on essentially private sector terms (QQ 130–131).

infrastructure, thus improving the environment for doing business. Another important aspect of SET's impact comes from the development of people who are SET literate, with an understanding and knowledge of science matters.

BOX 1: THE ENGLISH DEVELOPMENT AGENCIES

REGION	DEVELOPMENT AGENCY	ACRONYM	AREAS COVERED
East Midlands	East Midlands Development Agency	EMDA	Derbyshire, Leicestershire, Lincolnshire, Northamptonshire, Nottinghamshire and Rutland
East of England	East of England Development Agency	EEDA	Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk and Suffolk
London	London Development Agency	LDA	City of London and Greater London
North East	One NorthEast	ONE	Cleveland, Durham, Northumberland and Tyne and Wear
North West	North West Development Agency	NWDA	Cheshire, Cumbria, Greater Manchester, Lancashire and Merseyside
South East	South East England Development Agency	SEEDA	Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex
South West	South West of England Regional Development Agency	SWRDA	Avon, Cornwall, Devon, Dorset, Gloucestershire, Isles of Scilly, Somerset and Wiltshire
West Midlands	Advantage West Midlands	AWM	Herefordshire, Shropshire, Staffordshire, Warwickshire, West Midlands and Worcestershire
Yorkshire and The Humber	Yorkshire Forward	YF	Humberside, North Yorkshire, South Yorkshire and West Yorkshire

- 2.8 SET advances create a dynamism in the economy, delivering new technologies and approaches that impact on almost every aspect of our lives. Those advances generate an increasing technological sophistication in existing products and services, and thus play an important part in maintaining present economic activity. They can also lead to new kinds of products. Indeed, completely new industries grow out of the SET base, such as biotechnology and optoelectronics. This is "technology push", supplied by aptly named "knowledge industries" in the consequent "knowledge economy".
- 2.9 At the same time, there is also a "pull" or demand for SET-based advances. For example, the increasing attention to environmental issues and health and safety requires technological innovations in both products and the way they are produced — which, in turn, call for new products. Equally, there is increasing consumer demand for high-tech products that improve the quality of life, in many areas ranging from health to leisure and entertainment. Finally, as the internet bears witness, the very environment in which business is conducted is now highly dependent on technology and that, in turn, generates demand for new products and services.
- 2.10 A modern and prosperous economy thus depends crucially on the ability to harness scientific discovery and invention, turning that SET base into commercial products and services that are competitive in the global market place. While the case for the commercial exploitation of SET is well established, a new feature is the rapidity with which technology advances. The constant change means that not even the strongest industry can rest on its laurels.

THE COMMON CHALLENGE

- 2.11 Against that background, the common challenge — for the Government and the public sector; for business; and for the RDAs at the regional interface — is to ensure that scientific discovery and invention translates into activity that raises economic performance. This is SET exploitation.
- 2.12 We have discerned three different aspects to this common challenge. The first two relate to the demand side, namely:
- (a) technological innovation in existing companies, focused on optimising the value of SET — in the products and services themselves, in the production processes, and in the systems that are employed to run the business; and
 - (b) the growth of new knowledge industries, as described in paragraph 2.8.

These demand-side perspectives are discussed principally in Chapter 4.

- 2.13 The third aspect of the common challenge concerns the supply side. It covers the continuous supply of ideas, knowledge and expertise. This is achieved through a high quality SET research base combined with the education and development of people with SET skills. Supply-side issues are covered in Chapter 5.

Policy approaches

- 2.14 These three aspects of the common challenge are addressed through regional, national and European policies and initiatives. Collectively, these aim to increase the rate, range, and impact of SET exploitation for economic gain. The principal objectives of such policies and initiatives are:
- (a) increasing the awareness of the value of SET in all its forms (and, thus, demand for it) by existing businesses, driven by national and international competitiveness factors;
 - (b) maintaining and extending the national SET base through the supply of experts and SET-literate people, and a SET research base;
 - (c) ensuring effective interactions at the interface between SET demand and supply; and
 - (d) developing business enterprise through the provision of facilities and support for business spin-out and start-up from SET discovery.
- 2.15 The pursuit of objectives in each of these primary areas has, over a number of years, led to a wide range of initiatives, programmes and schemes. Demand-side issues are addressed primarily by DTI, while supply-side issues are handled mainly by the Department for Education and Skills (DfES) and the Office of Science and Technology (OST). Common to each is the issue of SET exploitation. In addition, the commercial exploitation of public sector SET assets — or “intellectual property” (IP) — has been addressed by the National Health Service (NHS), the Ministry of Defence (MoD) and the Department for Environment, Food and Rural Affairs (DEFRA).
- 2.16 With HM Treasury oversight of the funding arrangements, several Whitehall Departments provide policy input to the RDAs — principally DTI, ODPM, DfES, DEFRA and the Department of Culture, Media and Sport (DCMS). Government Offices in the Regions oversee Regional European programmes, whereas management of other SET-related European programmes is located in DTI.

SET DEMAND AND SUPPLY

- 2.17 In turning SET into commercial products and services, the interface between supply and demand is crucial. However, the demand, the supply and the nature of the interface between them is complex. Interventions must accommodate that complexity.

Complexity in demand and supply

Demand

- 2.18 The value of SET and the type of SET that is important to companies depends on a range of factors such as: the nature of their business and their products' dependence on SET; the size and maturity of the company; the competition; the speed of change of SET in relation to the type of company; and the life cycle of the products. We also take the point made by Mr Norman Price of AWM that companies' involvement in SET and SET exploitation depends on awareness, ambition, ability, and affordability (Q 76 and p 65) — all of which can vary widely case by case, resulting in many permutations.

Supply

- 2.19 The supply side is also complex. There are different providers of education and training delivered in different learning modes for different levels of qualifications. University departments have different research interests and emphases — from pure, through basic and strategic to applied research — and are, consequently, organised in a variety of ways. The SET base is not limited to the universities. Large elements are elsewhere in the public sector — for example, in the NHS, MoD and the various Public Sector Research Establishments.
- 2.20 The private sector also has a substantial stake in the SET base. Indeed, spending on research and development (R&D) by the private sector significantly exceeds public sector R&D spend: in addition to contracting with universities, many businesses have either in-house activity or access to specialist sector-specific research organisations. There is also substantial R&D spend by medical and other charities.
- 2.21 Nor is the SET base constrained nationally. It is an international resource, fuelled by the rapid dissemination of SET discovery through publications and scientific networks — although less so in the case of commercially sensitive discoveries.

Interconnecting supply and demand

- 2.22 Public policies on interventions to stimulate connections between the supply and demand of SET need to be informed by an understanding of their complexity. Paradoxically, the result needs to be as simple, straightforward and effective as possible bearing in mind that no one size fits all.

Complexity in exploitation

- 2.23 There are parallel complexities in the exploitation process. Policy interventions have generally been informed by a simple linear model of exploitation — in which ideas are generated, tested, identified as having commercial potential and then exploited. However, this does not match reality. As Professor Barrett of the University of Salford helpfully noted (p 244), it is more about evolutionary cycles, incremental improvements in processes and capabilities, chance events, relationships and tacit knowledge. Connectivity is complex and yields different types and levels of effectiveness.
- 2.24 It is therefore important that networks of formal and informal communication create the conditions for both continuous interchange and the building of relationships. The University of Salford's Centre for Sustainable Regional Futures (SURF) similarly observed that current theories of innovation reject a linear firm-based approach. They noted that the relationship between firms, universities and their wider environments was crucial in leading to improved economic performance (p 270).

Addressing the complexity in public policy

- 2.25 The complexity of supply, demand and matching it through exploitation is made even more complex by the dynamics of the market place. SET and business are continuously evolving, and policy and practices must adapt accordingly.

- 2.26 Making better connections between SET supply and demand has been a policy imperative for many years. A continuing Government aim has been to address the concern that the UK is excellent at invention but poor at turning that invention into commercial products. Many schemes and initiatives aiming to change stakeholders' behaviour in these matters have emerged from different Whitehall departments and the European Commission over the years, regional aspects of which are now often operated through RDAs.
- 2.27 The experience of all these interventions has led to an extensive knowledge base at the operational level of what works and how it works. However, we are not satisfied that such experience had been drawn on to ensure that many of the policies and initiatives about which we heard during our Inquiry were based on a sophisticated understanding of the demand-supply interaction.
- 2.28 Accordingly, **we recommend that, better to inform future policies on SET exploitation, DTI should work with business, universities and RDAs to carry out an analysis of the complex issues in the demand for and supply of SET.** That analysis should address the demand- and supply-side complexities discussed in this Chapter as well as the multi-faceted impact of previous policy interventions. Furthermore, they should be linked with the development of more adequate performance measures for RDAs on SET exploitation recommended in paragraph 3.28 as well as the new arrangements for overseeing SET exploitation recommended in paragraph 6.38.

CHAPTER 3: THE ROLE OF RDAs

INTRODUCTION

- 3.1 All RDAs recognise the importance of SET for regional economic growth (p 20). The complexity of the demand for and supply of SET, coupled with interface and exploitation issues, creates (as described in Chapter 2) a significant challenge for RDAs in framing and delivering their economic strategies.
- 3.2 The RDAs, which are relatively young, face the challenges as catalysts for change. They act as facilitators, enablers, brokers and funders — working in partnerships and collaboration with key stakeholders in both the public and private sector to deliver their Regional Economic Strategies. Operating within frameworks set by the Government, they seek the exploitation of SET that makes a difference in their individual regions.
- 3.3 This Chapter addresses the main issues for RDAs as facilitators. We turn in the following Chapters to the questions affecting RDAs' main partners.

THE ROLE OF RDAs

- 3.4 All regions are different. The mix of companies in their economies have different dependencies on SET as well as varying support needs, all leading to different priorities for action. Even so, all RDAs place emphasis on the importance of SET in their economic strategies (see Box 2).

BOX 2: THE IMPORTANCE OF SET

The importance of SET in economic development is exemplified in the comment from ONE¹³ (p 167):

“The SET base of the North East is a key regional asset, able to generate new products and processes and services in the Region’s businesses, and to create an attractive environment for investment, growth and sustainable employment.”

SET was “at the heart” of its Regional Economic Strategy¹⁴.

This position was reinforced by comments from the other RDAs:

- AWM saw SET as “critically important” to the development of the region’s economy (p 24);
- EEDA was seeking to spread the SET-based success of the Cambridge area throughout its region (Q 84);
- SET was an “integral part” of EMDA’s Regional Economic Strategy (p 41);
- LDA had identified SET as a “regional priority” by (p 94);
- NWDA’s recognition of the importance of SET had led it to establish England’s first regional Science Council (p 159);
- there was a strong recognition by SEEDA of SET’s contribution to a healthy economy (p 101);
- SWRDA regarded SET as “crucial” to the creation of a sustainable economy (p 113); and
- YF saw the region’s SET base as an “important asset for economic development” (p 175).

As summarised in the RDAs’ overview submission (p 20):

“All RDAs recognise the importance of a strong SET base to developing a healthy, dynamic and sustainable economy.”

¹³ For the key to RDAs’ acronyms, see Box 1 on page 13.

¹⁴ Also evident during our visit to Newcastle on 20 and 21 March 2003, see Appendix 8.

- 3.5 All RDAs are taking forward developments that support three main areas:

- (a) technological innovation;
- (b) the generation of high-tech and start-up companies; and
- (c) the development of the SET skills base.

Common approaches

- 3.6 Because of regional diversity, RDAs' initiatives take different forms. However, common patterns can be discerned from the copious evidence we have received. RDAs typically:

- (a) facilitate networks between businesses and between business and Higher Education Institutions (HEIs);
- (b) support the development of centres of excellence that encourage the development of technologies for commercial exploitation;
- (c) encourage enterprise through, for example, incubation facilities, Enterprise Hubs, Regional Venture Capital Funds and training programmes; and
- (d) help provide improved physical infrastructure to support business growth such as broadband provision and energy renewal.

Funding and leverage

- 3.7 On their establishment at the end of the 1990s, RDAs inherited 11 separate budgets from ongoing programmes and commitments funded by various Government Departments and Agencies, each with specific targets and monitoring procedures. In the 2001 Budget, RDAs were granted increased flexibility to switch resources within their budgets and to transfer funds to a new strategic programme.
- 3.8 Since the 2002 Budget, the bulk of RDA funding from Whitehall Departments has been combined in a single cross-Departmental budget known as the "Single Pot", amounting to £1.6 billion in 2002–03 and planned to rise to £2 billion in 2005–06. Even so, projects in inherited programmes such as the Single Regeneration Budget continue to pre-empt a portion of the available funding.
- 3.9 RDAs' 2002–03 budgets are summarised in Box 3. The wide per capita variation reflects in part the inherited regeneration and infrastructure projects (p 20). The Agencies' estimated SET-related spend probably understates the true picture by focusing on identified projects rather than the wider range of RDAs' activities in which SET is, in one form or another, an integral part.

BOX 3: RDA BUDGETS

RDA	2002–03 ALLOCATED BUDGET		SET-RELATED EXPENDITURE	
	£m	£ per capita	£m (estimated)	Budget %age
AWM	209	39	37	18
EEDA	82	15	10	12
EMDA	107	25	9	8
LDA	286	39	15	5
NWDA	283	40	39	14
ONE	208	80	60	29
SEEDA	109	14	10	9
SWRDA	100	21	10	10
YF	206	41	50	24
TOTALS	1590	32	240	15

Source: Table 1 of RDAs' overview submission (p 20).

- 3.10 In any case, the impact of the allocated budget can be greatly extended by leveraging funding from other sources, and that is encouraged by the business-led Boards. For investments in SET, there is a normal expectation for leveraging additional funds from the private sector, HEIs and other parts of the public sector, and from Europe. For example, EMDA spent some £9m on SET in its first two years which achieved a leverage of over £60m (p 41).

SET and Business Sectors

- 3.11 Every RDA has identified key sectors¹⁵ that are important in its Region's economic activity. Some of the sectors are new, some are long-established and growing while some others are declining. Each sector can have different and distinctive dependencies on SET. In-depth assessments by RDAs have identified where SET is a key driver to help provide the focus and priority for their interventions.
- 3.12 For many RDAs, an important focal point in their required Regional Economic Strategies is the generation of high-tech, high-growth industries — in areas such as biotechnology and optoelectronics, robotics or genomics. RDAs therefore commonly provide incubation facilities to nurture these companies from start-up to about the 2-year stage. Physical proximity with one or more universities was generally seen as crucial in the process of spin-out and incubation, to maintain the connection with the science base.
- 3.13 The best-studied concentration of small high-tech businesses is that in the Cambridge area. The most recent of a series of studies¹⁶ made since the establishment of the Cambridge Science Park in 1973 shows that, between 1986 and 1998, high-tech employment in the area approximately doubled to 32,000 jobs in over 300 firms, mostly small and medium-sized enterprises (SMEs). Over that period, the proportion of employees working for small firms significantly increased, and the software and biotech areas expanded more rapidly than others. The study concludes that the origin of virtually all the high-tech firms can be related directly or indirectly to the influence of the University.
- 3.14 Another example is BioCity (p 246), a collaboration between EMDA, the two universities in Nottingham and BASF — a major international SET-based company. In its first three months, it attracted seven bioscience and healthcare companies, with another 12 expressing serious interest. The aim is to create 5,000 jobs in a regeneration area of Nottingham.

SET and the Regional skill base

- 3.15 The maintenance and expansion of the SET skill base was the principal thrust of the Roberts Report *SET for success*¹⁷. That Report's recommendations were accepted by the Government and are now part of the national policy for science described in *Investing in Innovation*¹⁸. A number of these have implications for RDAs which have opportunities to take them on board in their required Frameworks for Education and Skills Action (FRESAs). **We recommend that all RDAs should explicitly address the development of SET skills and SET literacy in their FRESAs.**

¹⁵ Some sectors may also have geographically significant "clusters" of inter-related activities, with varying degrees of dependence on SET. The role of clusters in regional economic development is discussed further in paragraphs 4.43 and 5.54.

¹⁶ *The Cambridge Phenomenon Revisited*, Segal Quince Wicksteed Ltd, 2000, ISBN 0-9510202-2-6.

¹⁷ *SET for Success: the supply of people with science, technology, engineering and mathematics skills*, April 2002 — text available on www.hm-treasury.gov.uk

¹⁸ *Investing in Innovation: a strategy for science, engineering and technology*, July 2003 — text available on www.hm-treasury.gov.uk

Wider Issues

- 3.16 RDAs' Regional Economic Strategies are all-embracing. They range across, for example, economic inclusion, regeneration, rural development, energy renewal and saving, quality of life and health issues, and tourism. In addition to SET's being an economic driver in its own right, it also has relevance in a number of these agendas. SET therefore has a contribution to make to less obvious parts of Regional Economic Strategies.
- 3.17 Accordingly, for example, the NWDA had agreed to contribute £30m "towards the merger of UMIST and Manchester University to provide regeneration and development in the city centre as a beacon to draw research related business" (p 159). With an eye to the potential for tourism and education, NWDA was also supporting the upgrading of the Jodrell Bank radio telescope (Appendix 6). SEEDA had made investments in land and in an Enterprise Hub to stimulate the economy in an area where the Gross Domestic Product (GDP) was one of the lowest in the country thus combining social and economic policy through technology growth (Q 208). The Royal Academy of Engineering commended the NWDA for fostering links between the health care industry and the Defence Diversification Agency (p 310).
- 3.18 The general point was reinforced by English Nature which pointed out the importance of environmental issues on tourism, agriculture, forestry, nature conservation, water resources management and flood management (p 280).

OPERATING FRAMEWORKS

- 3.19 RDAs deliver their strategies and plans in relation to SET within policy, operational and structural frameworks largely determined by Whitehall. In addition to the accounting arrangements for their expenditure of public funds, they are subject to a range of targets to measure their performance as set out in Box 4.
- 3.20 Many witnesses expressed significant concerns that these targets and operating frameworks were not conducive to SET developments. While SET is clearly a factor in achieving many of RDAs' targets, it is mentioned only peripherally — in the definition of the final Tier 2 outcome on "innovation" as:
- "Make the most of the UK's science, engineering and technology by increasing the level of exploitation of technological knowledge derived from the science and engineering base, as demonstrated by a significant increase of innovating businesses, of whom a growing proportion use the science base amongst other sources of knowledge."

Moreover, the targets take no obvious account of the longer term over which SET delivers its economic impact.

Measuring success

- 3.21 A significant challenge and problem for RDAs in relation to this Inquiry was captured by Mr Martin Lyes of Enterprise Ireland:
- "What gets measured gets done." (Q 373)
- The evidence we received clearly indicates that the wrong things are being measured over too short periods.
- 3.22 SEEDA pointed out that, at Tier 2 level, GDP and productivity indicators are linked in a complex way which is hard to measure (p 136). Similarly, Yorkshire Forward noted that:
- "Tier 2 and 3 outputs focus on factors such as numbers of jobs created and the number of new business start-ups. ... Many new proposals — and, in particular, SET-based proposals — seem to offer poor value for money in that they often do not result in high numbers of jobs or the meeting of other Tier 3 targets." (p 175)

BOX 4: RDA TARGETS

RDAs' targets are organised in three tiers.

- **Tier 1** consists of high-level objectives (linked to RDAs' statutory purposes), namely:
 - a. to promote economic development and regionally balanced growth;
 - b. to promote social cohesion and sustainable development through integrated local regeneration programmes;
 - c. to help those without a job into work by promoting employment and enhancing the development of skills relevant to employment; and
 - d. to promote enterprise, innovation, increased productivity and competitiveness.
- **Tier 2** consists of regional outcomes that RDAs must work with partners to achieve, covering:
 - a. Sustainable Economic Performance;
 - b. Regeneration;
 - c. Urban;
 - d. Rural;
 - e. Physical development;
 - f. Employment;
 - g. Skills;
 - h. Productivity;
 - i. Enterprise;
 - j. Investment; and
 - k. Innovation.
- **Tier 3** targets or "milestones" refer to the outputs that RDAs are expected to achieve through their own activities and resource, and which will contribute to the achievement of Tier 2 targets. The five core milestones, applying to all RDAs, are:
 - a. employment opportunities (number of jobs created or safeguarded);
 - b. brownfield land (amount reclaimed or recreated);
 - c. education and skills (number of learning opportunities supported);
 - d. business performance (number of new businesses created); and
 - e. strategic added value (support mobilised for key priorities).

These Tier 3 targets are supplemented by up to 12 milestones for each RDA agreed as part of the corporate planning process.

3.23 EEDA noted that the "Tier 2 targets remain a stumbling block for delivery of complex and strategic activity at regional level" (p 35). A similar point was made by Universities UK (UUK).

"Success is best judged on performance and outcomes but it is vital to bear in mind that, when dealing with SET, the desired outcomes are likely to be a long way downstream. ... Benchmarks that assess projects for funding based on high numbers of low-value outputs (jobs created etc.) will not create effective SET development." (p 341)

3.24 On the matter of the time horizon, the RDAs noted that:

"support for innovation, science and technology and entrepreneurship requires a longer view than one year and can lead to positive outcomes not measured by current targets. Yearly targets can lead to short-term projects." (p 20)

The Chairman of ONE summed things up:

"the targetry we have at national level is very much out of kilter with our Regional Economic Strategies." (Q 280)

3.25 We have also been concerned that the performance measures relate to matters (such as regional GDP per capita) over which RDAs have insufficient leverage. It seems to us that the targets may be informed more by the availability of data than their relevance to RDAs' activities. We were also concerned to learn that only now is DTI thinking about

longer-term performance measures and, indeed, the baseline data needed to support these (QQ 17–21).

- 3.26 We were therefore pleased that the Minister said:

“I do take very strongly your point that we need to make certain that we do have the metrics to understand what is happening now and what is happening in the future. We can get some of this from things like the community innovation survey and some we can get from information which already exists, but I would hope, as part of the innovation review¹⁹, we can take a look at that and make certain that we really do have the metrics on a regional basis to measure what changes are taking place.” (Q 411)

- 3.27 The existing performance measurement arrangements do permit some scope for RDAs to develop measures particularly appropriate for their regional circumstances. Our recommendation in the next paragraph proposes that this be taken further and applied to higher level objectives, allowing more appropriate metrics to be developed in partnership with the key regional partners. A number of suggestions were made by our various witnesses — for example, the Royal Academy of Engineering (p 309), Oxford Innovations (p 298) and by the panel of HE knowledge-transfer professionals in oral evidence (QQ 125–170).
- 3.28 On the basis that what gets measured gets done, **we recommend that the Government should work with the RDAs urgently to develop simplified performance measures that take better account of SET’s importance in economic development, and accommodate both realistic timescales for results and the differing circumstances of individual regions.** (See also our related recommendations in paragraphs 2.28, 3.29 and 3.37.) This may well result in each RDA having its own tailored set of performance measures, to be worked towards in relation to nationally agreed outcomes for SET exploitation, as recommended in paragraph 6.38.
- 3.29 As noted in paragraph 3.10, RDAs are not just administrators of grants. A significant part of their efforts should be applied to mobilising funds from other sources. Indeed, **we recommend that, in framing the revised performance measures recommended in the preceding paragraph, the Government and RDAs should consider success in attracting others’ funding as a valuable indicator.**

Bureaucracy

- 3.30 RDAs have, of course, to be accountable for the public money they receive. However, we heard many concerns that the bureaucratic demands to meet this accountability were unnecessarily burdensome and sometimes contradictory.
- 3.31 SEEDA usefully summarised the position:
- “We have to conduct our business in accordance with numerous guidance documents totalling some 1400 pages [which] have been developed at different times, often in isolation from each other and inevitably embody contradictions and ambiguities as they come from several departmental sources. While some of this is useful and necessary to ensure appropriate public accountability, it also demands much effort in planning and reporting systems, some of which serves no useful purpose and strains our relationships with partners who are delivering on our behalf.” (p 136)
- 3.32 This problem was also identified by the Better Regulation Task Force in their July 2002 Report, *The Local Delivery of Central Policy*²⁰. They noted that:

¹⁹ See paragraph 6.7.

²⁰ Text available on www.brtf.gov.uk/taskforce/reports/LocalDelivery.pdf

"when we looked at the delivery process from Whitehall to the ground level, we found too many initiatives, confused accountabilities and overly bureaucratic monitoring and reporting systems. We recommend that the centre delivers a programme of reviews focused on local delivery issues which cross departmental boundaries."

Furthermore, they recommended that:

"the agencies charged with the delivery of skills and economic development should be ... granted the flexibility to develop local solutions."

- 3.33 Regardless of developing the stronger bottom up approach to performance measurement recommended in paragraph 3.28, **we recommend that the Government should reduce the bureaucratic load on RDAs and work with them to ensure that its guidance is reduced to the essential minimum and is, in any case, made consistent.**

Cooperative working between the RDAs

- 3.34 RDAs have effective networks at a number of levels. The Chairs, Chief Executives, Enterprise Directors, Learning and Skills Directors and Innovation Managers meet regularly. Networking is assisted by each RDA's taking a rotating lead on specific areas. (At the time of our Inquiry, for example, SEEDA led on science and innovation, EEDA on learning and skills and ONE on higher education.) Through the RDA/DTI liaison meeting, RDAs also have regular structured contact with colleagues from Scotland, Wales and Northern Ireland (p 20).
- 3.35 Apart from their intrinsic value for exchanging good practice, these networks provide a means of both influencing and responding to relevant national policies and directives in relation to SET. The networks also accommodate RDAs' recognition that many high-tech initiatives cross regional boundaries. We were pleased to note that RDAs readily liaise about such matters. The National Microsystems and Nanotechnology project is an example, involving many RDAs (as well as Scottish Enterprise and the Welsh Development Agency), working with the DTI to produce a strategy for developing and coordinating centres of excellence (p 20).
- 3.36 It is also recognised that cluster boundaries do not coincide with regional boundaries. The chemicals industry, for example, is particularly important in three northern RDAs, whereas the motor sport cluster is important in several regions in the South and East, and the aerospace sector involves several RDA regions and crosses into Wales. Cooperative working is essential to take full advantage of SET.
- 3.37 We therefore encourage RDAs to continue and deepen their cooperative working. Indeed, **we recommend that the Government should, as part of the revision of the performance measures recommended in paragraph 3.28, ensure that the measures contain incentives for cooperative working between RDAs.**

RDA Governance

- 3.38 Each RDA is managed by a Board of which the chairman and a significant proportion of the members are drawn from business. Many members also have significant strengths in SET. This business-led focus is one of the strengths of the RDAs, bringing valuable experience of business (with less risk-aversion²¹ than normally found in the public sector) and access to a wide range of contacts and networks. The business lead helps maintain a clear focus on economic development with business as the driver of wealth creation.

²¹ This is also assisted by staff being employed on private sector terms.

- 3.39 As the Regional Assemblies are formed²², they will take on responsibility for overseeing the work of RDAs, with a relationship similar to that between LDA and the Mayor and London Assembly. If RDAs are to maintain a tight focus on economic development, we hope that the changed relationship will not result in any dilution of the business lead on RDA Boards (as, indeed, maintained in London) that has done so much to target purposeful activity on economic development. **We therefore recommend that, whatever the future hierarchy of regional responsibilities, the leadership of RDAs should remain with the business community.**

REGIONAL CAPACITY BUILDING IN SET

- 3.40 Given the importance of SET in regional economic development, it is crucial that RDAs are well informed about SET. RDAs also need a reasonable level of competence in SET matters if they are to be able to make appropriate judgements in both planning and implementing strategic developments.

SET capability in RDAs

- 3.41 RDAs can obviously draw on expertise in business and in universities — whether within or outside their regions — to ensure that RDA policies and practices are properly informed by SET. There is also expertise in Whitehall departments, particularly the DTI. However, as the Department noted, none of its scientific or cluster specialists were on secondment to the RDAs at the time of our Inquiry (p 17).
- 3.42 RDAs have addressed this competency within their own agencies. Yorkshire Forward, for example, pointed out that its employees had in excess of 300 years' experience in managing technology in commercial environments, and its Board members had 100 years' experience in the senior management or directorship of SET-based companies (p 175).
- 3.43 However, a number of witnesses expressed concerns at the lack of expertise among RDAs' staff. This may be a particular problem in moving from Board-level strategy on SET²³ to the detailed implementation of SET-based projects. For example, the University of Nottingham noted:

“There is the question over the quality of RDA human resource to manage, facilitate and enable the complex environment of SET. From an RDA perspective, the effective management of SET should require a good understanding and knowledge of HEIs' research expertise, capacities and capabilities, whilst simultaneously holding in clear focus a longer term view of scientific exploitation, innovation, higher level skills and economic development. With a few notable exceptions, RDAs do not appear to have appointed key people across the organisations with the necessary credibility, experience, expertise and skills to manage these tasks.” (p 334)

- 3.44 Against that background, **we recommend that all RDAs should review their capabilities to ensure that they have sufficient operational knowledge and expertise to take SET initiatives forward.** To the extent that there are gaps in RDAs' expertise, we suggest that these might be filled at least in part by secondments and exchanges with the public and private sectors, to mutual advantage.

SET capability in the Regions

- 3.45 For SET to be effectively exploited and applied for business growth, there has, in each region, to be a shared understanding of what is required (demand) and what is available (supply). As noted in paragraph 5.17, some RDAs have undertaken a mapping exercise

²² Preparations for which would be put in place under the *Regional Assemblies (Preparations) Bill* being considered in Parliament during the course of our Inquiry.

²³ Perhaps informed by the Region's Science Council (see paragraphs 3.46–3.51.)

to assess regional SET strengths. Additionally, some are working with the DTI to improve business support aspects.

SCIENCE COUNCILS

- 3.46 As the Minister noted (Q 389), DTI has been actively encouraging RDAs to establish Science Councils to help build coordinated regional capacity in SET. Most RDAs have either already established such bodies or are actively planning to do so.
- 3.47 The first Science Council was set up in the North West in 2001. Its aims were, as Dr Brown of Arthur D Little Ltd noted: to lead the development of a science strategy at a regional level; to help secure commitment and resources for the science base; to act as an advocate for science and its role in the regional economy; and to develop an effective productive relationship between the SET base and Industry (p 268). While, as intended, the Council had a degree of independence from the RDA, the remaining link was important. As the NorthWest Science Council noted, the RDA was in a unique position to bring together the partners, facilitate progress, and channel the necessary resources and commitment into action and results (p 146).
- 3.48 Close behind the North West, the North East set up a Science and Industry Council in December 2001 (p 139), adding “Industry” to the title to underline the Council’s practical purpose. The LDA had an Innovation Steering Group which not only served as a Science Council but also took in the creative industries (Q 251). SEEDA had just established its Science Council (Q 250).
- 3.49 As we saw during our visits to the North West (Appendix 6) and the North East (Appendix 8), and as reinforced by the Science (and Industry) Councils’ written and oral evidence (p 139, p 146 and QQ 261–276), both Councils have made an impressive start. The business involvement and lead have been key in setting them up, but their strength lies in the amalgam of senior representation from business, academia and the public sector (including the NHS).
- 3.50 A Science Council provides an RDA with a regional mechanism for the in-depth assessment of SET aspects of regional policies. Because the businesses and universities are based in region but, by their nature, also have everyday contact with the national and international scene, such a Council is well-placed to assess SET matters in the light of both regional circumstances and national considerations. It can thus play a key role in advising the RDA on SET generally and on related funding allocations. Moreover, such a Council provides a clear channel to serve current and emerging industry needs in key clusters, as well as a means of connecting with national SET activities and policies such as Foresight.
- 3.51 **We recommend that all RDAs should have a regional Science Council or similar body and that RDAs should collaborate in assisting those Councils to network and make good connections with national SET and Innovation bodies and policies.**

CHAPTER 4: THE DEMAND FOR SET

INTRODUCTION

- 4.1 Business is crucial in driving the regional economy, and SET has an important part to play in driving business. Companies — the engines of wealth creation — will exist and transact business whether or not the RDAs or other support agencies exist. They are driven by the markets, and their success depends on their ability to grow and create markets, within the Government-set regulatory and fiscal frameworks. Companies' location in a region, and their involvement in SET are significantly influenced by competitiveness and profitability factors.
- 4.2 This Chapter addresses, in a regional context, the particular issues relevant to business in relation to the exploitation and application of SET.

DEMAND ISSUES

- 4.3 Government and regional policy relevant to our Inquiry is essentially about stimulating greater awareness of the value of SET in more businesses, within a broader context of encouraging innovation. It is business that, through the application and exploitation of SET, turns discovery and invention into new or improved commercial products and services. As these products stimulate or meet a market need, and are of the quality and price to compete in a global market, business will prosper. As business prospers so the regional and national economy prospers.
- 4.4 Measures of R&D investment are often used as useful proxies for such activity. The DTI produces useful analyses and benchmarks in the R&D Scoreboard²⁴ of company and sector performance. However, the level of R&D investment required varies from business to business.

The complexity of the demand

- 4.5 Demand for SET is complex. Technologically-dependent sectors or companies will have different requirements from those that are less SET-dependent. Within those broad categories, there will also be differences: the demands of chemistry-based industries, such as pharmaceuticals, will differ from physics-based industries such as electronics. In each case, emphases and issues will vary in relation to the importance and value of the SET base for the company's competitiveness.
- 4.6 Those considerations are not always straightforward. As noted in paragraph 2.18, we found helpful the division of demand factors by Mr Norman Price of AWM into companies' awareness of the potential, their ambition to realise the potential, their ability to do so and affordability (Q 76 and p 65). The last is determined largely by the investment community. While that community faces its own pressures to invest for a reasonable return, it must also keep pace with the way SET and technological innovation is changing the ways companies operate and grow.

Innovation Strategies for businesses

- 4.7 Such a demand can, as Pera International pointed out, be encouraged through companies' developing Innovation strategies, as part of which they can recognise and articulate their demands for SET in company growth. Pera noted that "a confident and articulate demand side can generate market driven developments in the SET base, which is preferable to expecting companies to respond to top-down planning of technology transfer mechanisms". They had identified a number of successful approaches that were beginning to emerge to support the development and adoption of such strategies within businesses (p 301).

²⁴ Details available from www.innovation.gov.uk/projects/rd_scoreboard/introfr.html

- 4.8 The Small Business Service (SBS) and the Business Links provide a business support service that could help companies work through innovation strategies. DTI pointed out that it was working with RDAs on business support to achieve better coordination of business support services at the local level and ensuring that Business Links promote Regional Economic Strategies (p 17). Mr Bryan Gray of NWDA noted that a number of the RDAs were running pilots to deliver business support by taking Business Links into their organisations (Q 285).
- 4.9 We would strongly encourage the joint working between RDAs and DTI on intervention strategies to generate increased awareness of the value of SET, addressing in particular the value of helping companies develop their innovation and R&D strategies.

HIGH-TECH COMPANIES

- 4.10 High-tech companies are highly dependent on continuous SET discovery for survival and success in their own markets. As they generally produce high-value goods, they are seen as key in the success of the economy.

Importance of Innovation

- 4.11 Innovation is the sustaining life blood of industries such as aerospace, pharmaceuticals, software engineering and medical technology. As the Society of British Aerospace Companies pointed out:
- “it is only when a strong science base is applied in some form or other that its value is realised, and it is industry that turns the pamphlets of universities into life-enhancing products and services for society.” (p 327)

- 4.12 Harnessing the SET base is always high on the agendas of these high-tech and highly SET-dependent companies. Issues for such companies include:
- access to an excellent science base;
 - the identification of commercial potential of discovery;
 - R&D work that begins to turn an invention into a commercial product; and
 - the continuous supply of skilled people.

Supply chain links

- 4.13 New discoveries and technologies are giving rise to new companies and even new industrial sectors. New products make impacts on the supply web in various ways. For example, components manufacturers for cars or aircraft require more technologically sophisticated products from their suppliers; new industries in biotechnology require particular technologies to meet their needs; and public transport or health systems require products to address safety and health issues. They all require people with the right knowledge and skills.
- 4.14 Some of these sectors, and companies within them, are major employers in a region both directly and as a result of multiplier effects. For example, the Midlands aerospace cluster generates 45,000 jobs, many of them highly-skilled (p 81).

RDAs and the Growth of High-Tech Industries

- 4.15 The high value-added from successful high-tech businesses means that RDAs aim to support their growth. RDAs provide a range of services such as:
- support for business spin-out from the SET base;
 - incubation facilities and services;
 - development of science parks; and
 - assistance with IP management services.

Some RDAs also provide additional support in the form of specific seed-corn funding or regional venture capital funds. RDAs both initiate new developments and build on existing ones to strengthen them.

- 4.16 Collectively, RDA activities such as these help to establish the development of high value-added industrial clusters that are dependent on advanced technology. RDAs' general aim in doing so is to achieve critical mass to impact on the regional economy. Such a focus attracts companies; provides specialist facilities for spin-out companies from the SET base; and can also provide a magnet for Venture Capitalists. An additional advantage of such physical groupings is that they also provide a support network in themselves for start-up and spin-out entrepreneurs.

FUNDING THE EXPLOITATION GAP

- 4.17 Recognising a commercial SET opportunity is, of course, only the first stage. The crucial next step is for companies to be able to finance the desired developments. It was disappointing to hear Mr Gavan's general view that the cost of doing numerous small deals in early stage companies was too high to support a commercial rate of return (Q 327), and we have discerned two particular aspects of the financing needs of new high-tech growth companies.

- (a) The first concerns the funding of the exploitation gap in the very early stages of technological development and proof of concept. As Dr Keaton of Campus Ventures noted, "there is a lack of pre-seed funding to establish the market potential of a product and this seems to be a key constraint" (p 203). AWM also identified this as a key concern in their evidence (p 24), and Mr Gavan made the point that "there is enormous pent-up demand for investment in the lower range from £100K–£500K. Business angels support is patchy" (Q 322).
- (b) The second relates to the growing gap for the next stage of equity development capital financing in the range £½m to £5m, usually provided by private sector venture organisations.

We deal with each stage separately below.

Early stage financing

- 4.18 We received evidence from HE knowledge-transfer professionals (QQ 125–170) and from RDAs about very early stage financing, when up to about £½m is needed. HE and RDAs each provide financial assistance. Examples include University Challenge funds and various regional initiatives such the Government-funded (but with private sector leverage) Regional Venture Funds. Such financing — augmented by other initiatives of a national (e.g. SMART²⁵ Awards) or local nature (networks of local "business angels") — often helps the proof of concept of a technological innovation. However, the proof of concept may not be completed, thus leaving uncertainty about the innovation's market potential.

- 4.19 We draw several conclusions about this stage of financing.
- (a) Funding available at both regional and national level rarely exceeds £½m.
 - (b) RDAs have a necessary role in not only facilitating and sponsoring such financing but also in advising about it. We were encouraged by the good start made by all RDAs and welcome, in particular, the NWDA's incubation programme (p 203).
 - (c) However, we believe more could be done to spread examples of best practice. For example, during our visit to Scotland (Appendix 5), we found that Scottish Enterprise's Enterprise Fellowship Scheme and the Proof of Concept Fund were

²⁵ Small Firms Merit Award for Research and Technology.

well-received and yielding results. English RDAs might find these initiatives of interest.

Second stage financing

- 4.20 Turning to the next stage of financing need (£1/4m to £5m), we found evidence of a greater need for innovative sources of equity finance. The lack of interest from the more conventional sources (high net worth individuals and UK financial institutions) is both recent and significant. Several witnesses noted that the Venture Capital risk climate had changed following the dot.com bubble, leaving investors even less willing to invest in higher risk high-tech industries among the investment community.

The way forward

- 4.21 This matter also emerged strongly in the Committee's recent Inquiry into innovations in microprocessing²⁶ in which we made wide-ranging recommendations to the Government and the financial community to remedy the situation.
- 4.22 We are aware that the Government recognises the need for equity financial support for high-tech growth companies to fill the needs described above. The recent Government consultation paper *Bridging the Finance Gap*²⁷ sought views on whether the creation of Small Business Investment Companies (SBICs) along the US model would help. SBICs have access to public sector loan capital, with repayments on easier terms than otherwise available, to part-finance vehicles to invest equity capital for early stage growth companies. We await the Government's conclusions with interest.
- 4.23 In the meantime, **we recommend that RDAs should collectively establish a small working party of officials and private sector financial advisers to draw up and propose to HM Treasury and DTI innovative solutions to funding the exploitation gap for early-stage financing of high-tech enterprises. Given the urgency of the needs, we suggest completion of the task by the end of October 2003.**

LESS SET-DEPENDENT COMPANIES

- 4.24 The crucial importance of SET to the survival and growth of high-tech companies is self-evident. Less immediately obvious is the relevance of SET for companies more generally. Almost any company can benefit from technological innovation — to improve not only their products but also their production processes and operating systems (through, for example, adopting IT solutions).
- 4.25 A good example was provided by the Institute of Food Science and Technology. Companies in the food and drink sector are very significant in a number of regional economies. They can benefit from SET to improve performance and products. "They want proven, trusted and relevant knowledge and science that they can apply practically in context. Much of this may not be novel *per se*, but may well be new to the businesses, and is therefore innovation" (p 285). This position is relevant to many sectors and clusters.

SMEs

- 4.26 Engaging SMEs (80% of which employ fewer than 50 people) is a particular challenge for RDAs. Clusters and Business-led Networks could help address this.
- 4.27 The middle market (that is, medium-sized companies at a particular stage of growth) seems under-utilised as a area for SET exploitation. It has existing infrastructure and routes to market. There is relative stability, an ability to cross-subsidise and access to

²⁶ See Chapter 10 of *Chips for Everything: Britain's opportunities in a key global market*, 2nd Report Session 2002–03, HL Paper 13-I.

²⁷ *Bridging the finance gap: a consultation on improving access to growth capital for small businesses*, HM Treasury and SBS, April 2003 — text available via www.hm-treasury.gov.uk

more discretionary resources. Its members have an advantage of scale over smaller companies. If understood and focused, technological innovation could lead to relatively rapid modernisation and diversification — transforming existing medium-sized companies into real growth opportunities. As Mr Norman Price of AWM noted, the issues for them are mainly awareness and ambition (p 65).

- 4.28 RDAs can help support both the middle and small business market for SET by addressing the key issues for them. As Mr Wren-Hilton noted, Business Link and RDA activities appear to concentrate on general business issues and do not have a particular focus on innovation (Q 318). The new arrangements between the SBS and the Business Links noted in paragraph 4.8 could help to redress this.

THE ROLE OF INTERMEDIARY TECHNOLOGY INSTITUTES

- 4.29 A recurring theme in the evidence from business interests is the need to address applied research and technology — the translation of ideas into products. This means developing a national research base which has an industrial focus, giving as much attention to innovation or the successful exploitation of ideas from the SET base as to original scientific discovery. Such a base could provide a particularly interesting context for multidisciplinary work.

National intermediary organisations

- 4.30 One of the ways that RDAs and other organisations have sought to address technological development is through intermediate organisations. One example is the Faraday Partnerships²⁸, set up by the DTI through a national programme.
- 4.31 The Association of Independent Research and Technology Organisations (AIRTO) pointed out that it was the largest community of SET knowledge-transfer companies in Europe. Its member bodies employ some 20,000 scientists and engineers across the country and have an annual turnover of £2 billion (p 241). European equivalents include Germany's Fraunhofer Institutes²⁹ and the VTT in Finland. Examples of good practice are beginning to emerge for collaboration between AIRTO organisations and the RDAs, and we would encourage the wider dissemination of these.

RDAs and Intermediary Institutes

- 4.32 RDAs are also stimulating the development of Intermediary Institutes, Centres and Ventures to address the exploitation of SET for commercial products. The North East, for example, is developing Centres of Excellence in five major areas related to their sector growth (p 167). As Professor Green noted, Yorkshire and The Humber has Centres of Industrial Collaboration (Q 139). There are also Regional Food Technology Transfer Centres based in HEIs with strong involvement in food and drink education. EEDA has supported an Innovation Centre in plant biotechnology, linked into the University of East Anglia (Q 116).
- 4.33 RDAs are collaborating over a networked Nanotechnology centre (p 20). AWM announced a new £70m Automotive Research Centre to support the manufacture of premium/luxury products, to which the RDA has committed development and financial support (p 65). The NWDA has invested £25.7m to develop Daresbury's Science Park to help secure its future as a Centre of Excellence for R&D to link science and industry

²⁸ The business-driven knowledge base/industry Faraday partnerships were launched in 1997 as means of bringing together public and private sector SET research and exploitation on both industry-specific and cross-cutting subjects identified from Foresight priorities. The Partnerships bring researchers and businesses together through the involvement of intermediate organisations and "technology translators" (business-literate scientists and engineers). They use private capital and various support schemes to bring new products and processes to the market faster.

²⁹ The 60 or so Institutes run by the Fraunhofer Society focus on priority areas of SET exploitation. As noted by the British Embassy in Berlin, the Society receives 40% of its funding from the Federal and Länder Governments, with the remaining 60% from contract research (p 252).

in a direct and effective way, supported with an additional grant of £11.5m from the DTI³⁰. AWM suggested that Development Institutes for SET development activities might usefully be set up as charitable bodies (Q 87 and p 65).

- 4.34 We agree that, as a concept, intermediary technology institutes and the like are excellent. However, to achieve their purpose, they must relate closely to markets and have exceptional leadership. In the longer term, those that are good should become substantially self-financing from royalties or other income from their innovations.

Innovation Partnerships

- 4.35 Professor Sir Gareth Roberts drew our attention (Q 177) to the proposal in his April 2002 Report *Set for Success*³¹ to provide a more substantial and coherent approach to innovation by developing regionally-focused Innovation Partnerships. He was pleased that the Government had accepted the thrust of the recommendation³² and the general principles that such partnerships should: include the training and development of people for SET; pursue research that was business-led and focused on commercially oriented R&D; be focused on regional clusters of businesses with particular research interest; and receive Government investment, alongside that from the prime funders.

University centres

- 4.36 Universities also have centres of expertise that have a particular interest in applied issues. The Warwick Manufacturing Institute³³, directed by Sir Kumar Bhattacharya, is an often-quoted example. There are many other applied research groups in universities that have a particular interest in working with the industrial base on the development of new products or processes, and some of the research groups intimately relate to particular industries or sectors that can impact on regional development. One example is CATE (the Centre for Aviation, Transport and Environment) at Manchester Metropolitan University which addresses environmental quality issues for the airport industry. Manchester Airport is a significant economic driver for the North West, and its ability to take account of environmental considerations is crucial for its future growth.

Clarification of interconnections

- 4.37 We were struck by the range of initiatives and ideas aimed at encouraging industrial or applied research that turn scientific discovery into products. However, sectors and clusters have differing needs for industrial research aimed at developing products from SET discovery. **We recommend that DTI and RDAs should, in consultation with the providers and users of research, jointly ensure that means are available to identify and address gaps in the provision of applied and industrial research in relation to different SET-dependent sectors and clusters.**

FACILITATING MECHANISMS

- 4.38 A variety of ways to facilitate development were brought to our attention during the Inquiry. These all aim to ensure that SET resources are effectively harnessed for business growth, but some concerns were expressed about how effective these were in practice.

³⁰ DTI Press Notice P/2003/216, 2 April 2003.

³¹ Recommendation 6.7 of *SET for Success: the supply of people with science, technology, engineering and mathematics skills*, April 2002 — text available on www.hm-treasury.gov.uk

³² On page 120 of *Investing in Innovation: a strategy for science, engineering and technology*, July 2003 — text available on www.hm-treasury.gov.uk

³³ A key partner in the Automotive Research Centre noted in paragraph 4.33.

Support Schemes

- 4.39 There is no shortage of support schemes to encourage businesses to innovate through technology. (SMART is one example.) Indeed, there are far too many schemes, leading to high transaction costs in applying for and administering them, and wasteful confusion and lost opportunities under complicated rules.
- 4.40 Dr Keaton of Campus Ventures captured the concern, highlighting the duplication and making the case for simplification by putting the multiple funding sources into a single pot (p 203). The Better Regulation Task Force noted³⁴:

“when we looked at the delivery process from Whitehall to the ground level, we found too many initiatives, confused accountabilities and overly bureaucratic monitoring and delivery systems.”

This point was reinforced by the Royal Academy of Engineering:

“simplification of access to processes and opportunities would greatly enhance the RDAs’ effectiveness.” (p 309)

- 4.41 There were also concerns that the Government takes too short-term a view on innovation. As Mr Wren-Hilton noted:
- “the funding sources that occur in the UK tend to be fairly short-term, the stakeholders change on a fairly regular basis and you are not sure who is administering the grants. ... It is very much a piecemeal, patch-it approach, there is not the integrated longer-term approach which companies actually require ... we need to be able to plan.” (Q 344)
- 4.42 DTI had recognised the need for a rationalisation of schemes and, at the time of our Inquiry, was undertaking a review (p 17). We welcome this, and the Minister’s aim to reduce the schemes from around 150 to about 20 (Q 396).

Networks

- 4.43 A major role for RDAs is facilitating connections — between businesses, between them and supporting agencies, and with the SET base. A significant part of RDAs’ delivery mechanisms for these interactions and developments are their cluster policies, informed by the works of Professor Michael E. Porter of Harvard Business School and encouraged by the DTI. RDAs also encourage the formation of networks.
- 4.44 Businesses have their own extensive networks. These can be local, regional, national and international. Companies are located in sectors and sub-sectors that are networks in themselves. They may also have particular network organisations or institutions to support them, or clubs and events to bring businesses together and sometimes together with the supply base. They are part of supply chains, supply webs and supply networks and have intermediaries such as Chambers of Commerce, the Institute of Directors (IoD) and the Confederation of British Industry (CBI).
- 4.45 All these afford significant opportunities for acquiring knowledge, information and intelligence for companies, that are important for knowing the competition and for influencing their own competitiveness. Mr Liversidge pointed out the importance of networks such as Medilink (for the medical technology sector) for business to be able to talk to business on specific areas of common interest relevant to their specific sector (Q 313). Dr Toon noted the importance of being involved in a network (resulting from biotechnology cluster developments in the North West) as a start-up business.

³⁴ In its July 2002 Report, *The local Delivery of Central Policy* — the text of which is available on www.brtf.gov.uk/taskforce/reports/LocalDelivery.pdf

"To recognise you are not alone, even if it is just once a month over a cup of coffee talking to people in similar situations, is a tremendous help and that leads to contacts and Government funding." (Q 316)

- 4.46 The Institute of Physics (IoP) drew our attention (p 287) to its recent report on *The Importance of Physics-based Industry to the UK economy*³⁵ This identified the importance of clusters and networks in the sustainability of new physics-based industries (such as photonics and nanotechnology), noting that cluster effectiveness was enhanced by proximity to universities.
- 4.47 The existing networks are useful vehicles, if appropriately harnessed. They might provide the answer to EMDA's question about how to "create systems where brokerage is second nature, where people are actually connected up with the specialisms they need, without a whole series of intermediate processes that somehow block them off from those centres of expertise" (Q 91).

Access to University expertise

- 4.48 Universities have increasingly addressed the issue of access to their expertise through the establishment of specific offices that provide gateways for business and through web site information. Although a number of Regional University Associations are helping to provide comprehensive gateways for business, it is not clear how these link together to provide a coherent picture of the resources available to businesses from universities.
- 4.49 Business still experiences difficulties of access to universities. As Mr Wren-Hilton noted, one of the difficulties facing SMEs is knowing how to find out from universities and colleges what R&D is being pursued and who specialises in what innovation (Q 317).
- 4.50 From the university perspective, an interesting point was made by Professor Sir Gareth Roberts:

"83% of industries never set foot in a university and have no idea what a university can offer. They are not just SMEs. They are the medium to large companies. I think we should have RDAs searching them out." (Q 172)

Coordinated information

- 4.51 Against the background of the preceding paragraphs, **we recommend that RDAs work with SBS, Business Links, businesses, universities, Research Councils, charities and other relevant organisations to produce, publicise and keep up to date a web-supported intelligence service on SET support.** The service should cover both regional and national perspectives and provide intelligence and interpretation in relation to sectors and clusters on:
- relevant intermediary research institutes and their equivalents;
 - the particular strengths of universities (as recommended in paragraph 5.57);
 - the access points and gateways into universities;
 - collated information on current and recent research projects;
 - the networks and clubs for business; and
 - schemes and initiatives — regional, national and European — that support innovation.

³⁵ Published in March 2003, text available at <http://industry.iop.org/PBI.html>

PUBLIC SECTOR PROCUREMENT

- 4.52 The growth of any sector depends on businesses securing orders. The public sector is one of the largest purchasers in any region. Government Departments, the NHS, local authorities and so on all require goods and services, often with a high level of technological sophistication, for a wide range of purposes.
- 4.53 As described earlier in this Report, RDAs are facilitating and supporting high value-added technology based sectors. The spin-out and start-up companies they are encouraging are part of the supply web of the public sector, and can supply goods and services that are technologically sophisticated.
- 4.54 In the Report of our recent Inquiry into innovations in microprocessing, we noted³⁶ that public sector purchasing power could neatly complement Government policies to encourage the start-up and growth of high-tech businesses. This Inquiry has, however, highlighted a significant gulf between what should be related policies.
- 4.55 We were concerned to learn from Mr Wren-Hilton that his Internet company was precluded from bidding for a project within its technical competence (and in which it had a good international track record) solely on grounds of turnover (p 218). Mr Liversidge told us of a small Yorkshire-based company making high-tech medical kit needed by a local hospital but which, because of purchasing policies, could sell to that hospital only through the German-based preferred contractor (Q 341). He and Professor Rhodes drew our attention to the American Government's Small Company Set-Aside Scheme (QQ 324 & 322), which addresses these points by ring-fencing some smaller procurements for SMEs and by penalising the prime contractors in larger procurements if a certain proportion is not sub-contracted to SMEs.
- 4.56 We put that interesting suggestion to the Minister (Q 407), but were disappointed in his quick rejection of the approach. This denies opportunities to small companies and, in hindering their growth, reduces dynamism in the regional and national economies. As smaller firms are lighter on their feet and can thus be the most innovative, it also denies the public sector the opportunity to benefit from their fresh thinking.
- 4.57 Accordingly, we recommend that the DTI should re-examine the case for arrangements like the USA's Small Company Set Aside Scheme to help small businesses to access and thus assist public sector procurement.

³⁶ Paragraphs 10.21 to 10.24 of *Chips for Everything: Britain's opportunities in a key global market*, 2nd Report Session 2002–03, HL Paper 13—I.

CHAPTER 5: THE SET BASE

INTRODUCTION

- 5.1 Having considered the demand for SET in Chapter 4, we turn in this one to its supply. Given the focus of our Inquiry, we address the SET base from the particular perspective of regional economic development and, thus, the interrelationships with the RDAs.
- 5.2 Technological innovation springing from a vigorous SET base is the seed corn for economic growth. SET research ranges from discovery for its own sake (largely done in universities) to research that is applied to the needs of industry and commerce (largely done in the private sector). The two communities interact to advance both SET and its exploitation. They communicate through international networks, conferences, research journals and collaborations. The SET base thus spans the public and private sectors, and is international.

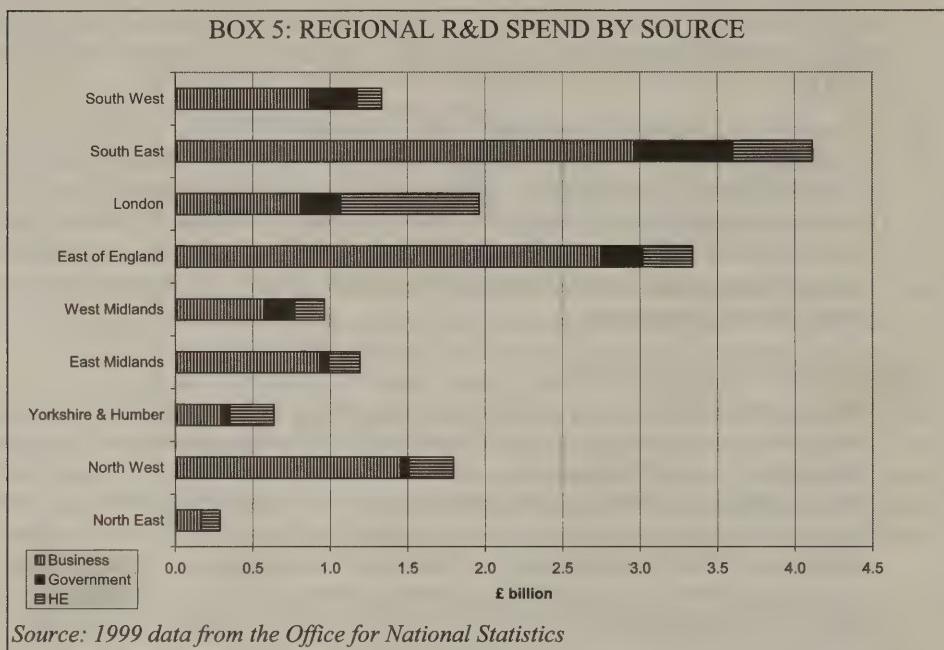
THE PUBLIC SECTOR SET BASE

- 5.3 Public sector SET is widely acknowledged as critical in the process of technological innovation. As a source of new knowledge, it is the springboard for the successful development of SET-dependent companies in every field — biotechnology, pharmaceuticals, microelectronics and aerospace, to name a few. It is also important for competitiveness more generally — not least by training the scientists, engineers and technologists that maintain the life blood of development. Arguably, the most important contribution made by the education system is the nearly 190,000 people who gained SET-based qualifications from British HEIs in the academic year 2000/01³⁷.
- 5.4 The United Kingdom has an extensive SET base, resulting from an annual public investment of nearly £8 billion³⁸. The SET base encompasses pure (or “blue skies”) and applied research. It operates through various channels such as university departments, Public Sector Research Establishments, and contracts placed with third parties by Government Departments and Agencies such as MoD, DEFRA and the NHS.
- 5.5 Recognising the need to ensure that the critical mass in SET was maintained and developed, the Government’s 2002 Spending Review announced the largest sustained growth in science expenditure for a decade — £1.25 billion by 2005–06. That increased investment has been widely welcomed.
- 5.6 Public sector investment in SET occurs in two main ways.
 - (a) Funding from the Research Councils and the HE funding councils is distributed on a national competitive basis. There is never enough to meet the aspirations of all. Each competition can result in significant funding losses or gains for individual universities. Regions with a strong university base are thus at a considerable general advantage.
 - (b) Funding goes direct from the Government or Research Councils to various specialist public sector SET research centres. Although, their presence can be very helpful to the regions that happen to have them, their location and funding is generally the result of national rather than regional considerations.

³⁷ *Students in Higher Education 2001/02*, Higher Education Statistics Agency (HESA), April 2003.

³⁸ Planned net Government expenditure on SET (both civil and defence) in 2002–03 was £7.8 billion — *UK 2003, the Official Yearbook of the United Kingdom of Great Britain and Northern Ireland*, Office of National Statistics, 2002, ISBN 0 11 621552 6

- 5.7 The result from the regional perspective is essentially random, as illustrated in Box 5. This shows the wide disparities in R&D spend between regions in 1999, the latest year for which full information was available at the time of writing (and about the time the RDAs were being established). The business spend was clearly much larger than that by either the Government or HE.

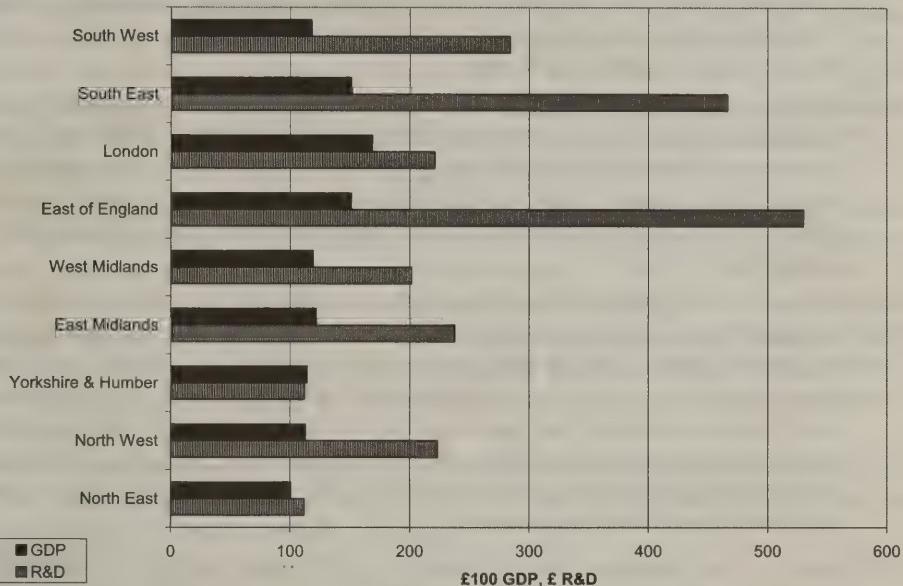


- 5.8 The aggregate inter-regional disparities are in part attributable to substantial size differences between the regions, as discussed further in paragraph 5.11.
- 5.9 However, we cannot move on without calling particular attention to the very low proportionate Government R&D spend in the four northernmost English regions. As shown by the business and HE spend, these are not scientific deserts. In anticipation of the Government's response, we acknowledge that these data are now four years old, predating both the boost to science funding noted in paragraph 5.5 and any impact of RDAs' activities.
- 5.10 A principal thrust of our Report (and, in particular, of our recommendations in paragraphs 5.26 and 6.38) is to establish a better process for handling national SET investment with not only the present regard to high quality but also an eye to regional impact. As an adjunct to that, **we recommend that the Government should urgently publish the latest possible information about its R&D spend per region, and keep this up to date as a measure of its performance in supporting regional economies through nationally-provided SET.**
- 5.11 Box 6 shows regional GDP and R&D spend, in both cases calculated on per capita basis. Again on 1999 data, per capita GDP varied by nearly 50% between the different English regions. The variations in per capita R&D spend were very much greater, correlating only weakly with per capita GDP. In some cases, it may be that R&D was not located in the same region as the industry it supported and thus had a minor effect on GDP in its own region. In addition, the required level of R&D spend will vary considerably from industry to industry. Variations between regions may be partly explained by the nature of their main industries.
- 5.12 The Centre for Urban and Regional Development Studies (CURDS) at the University of Newcastle upon Tyne noted:

"There is an uneven geography in national science policy, in which historical patterns of investment have favoured the core regions of the UK, London, South East and East of England. National SET policies reflect this view, and so there is strong congruence between national priorities and the areas of SET in which these core regions have expertise, such as biotechnology and motorsport." (p 275)

Similarly, SURF noted that half of publicly funded R&D goes to London and the South East (p 270), underlining an often expressed concern that public investment in the science base was apparently made without particular reference to regional issues or regional needs.

BOX 6: REGIONAL GDP AND R&D SPEND — PER CAPITA



NOTE: For ease of comparison, GDP per capita is plotted as one hundredth of its true value.

Source: 1999 data from the Office for National Statistics

REGIONAL PERSPECTIVES ON THE SET BASE

- 5.13 RDAs take forward their Regional Economic Strategies within the national policies and investments in SET. Past national investments have left each region with a SET legacy. This may or may not be of critical mass — either generally or, more particularly, in relation to the business sectors or clusters the region has identified as growth areas. The public sector legacy may have been enhanced by private sector investment, principally by large companies.
- 5.14 The collaborative strength of the universities in a region is generally recognised as a vital component of achieving critical mass in SET. Each region contains a number of universities, ranging from five in the North East to 40 in London. Whilst all regions have regional university associations, other collaborations exist — such as Yorkshire's White Rose Consortium of Leeds, Sheffield and York Universities (p 159). Generally, university collaborations, like those of private companies, are motivated by a desire to improve their national position rather than to satisfy any particular regional agenda.
- 5.15 The importance of SET for Regional Economic Strategies places increasing pressure on RDAs to do what they can to coordinate and support the SET resources in their regions. They have to recognise that SET expertise is global, as is the commercial

competition. The challenge for RDAs is to decide where and how to access that expertise, and where and how to strengthen capacity regionally.

RDAs and SET investments

5.16 RDAs are faced with achieving the right balance between:

- (a) helping to develop the SET base, because of its potential for strengthening economic growth; and
- (b) exploiting SET, wherever it is, for regional advantage.

Their primary interest is in exploitation — turning SET into economic value. To do that, however, their SET base must be vibrant and accessible.

5.17 A number of RDAs have begun to map out the geographical availability of SET expertise within their regions. Some of that mapping is undertaken in relation to clusters, but the interrelations are not simple: for example, expertise in one discipline may relate to a number of clusters.

5.18 In their mapping exercises, RDAs tend to concentrate on university provision of research expertise and strength, often defined by performance in the national Research Assessment Exercise (RAE) the outcomes of which determine the Funding Councils' allocation of research funds to universities. Indeed universities with research groups that have been highly graded in the RAE tend to be fertile sources of new SET start-up companies.

5.19 However, in allocating funds through the RAE, the first priority of the Funding Councils is to ensure that those university research groups that are internationally competitive are adequately funded for their role, wherever they may be located. This policy means that there is often little funding left for groups that are judged to be below that level (i.e. Grade 4 and below on the current RAE scale). Although outstanding research achievements undoubtedly add strength to the science base in a region, many of the important problems that face business on a day to day basis may be solved with less stratospheric levels of expertise.

5.20 Some of our witnesses were concerned at the extreme levels of selectivity that were applied to funding on the basis of the 2001 research assessment exercise. This meant that many University departments that could offer valuable support to local business were facing a bleak future on reduced funds. We share this concern and believe that, where this is the case, it may be for RDAs to help support university departments in SET exploitation that is important for economic growth³⁹.

5.21 ONE (p 167) and the University of Newcastle upon Tyne (p 332) were far from alone in raising concerns about present funding arrangements, where national investments concentrated primarily on world-class research (RAE grades 5 and 5*) and proportionally reduced funding for research achieving national excellence (RAE grade 4). In the longer term, it is for consideration that the RDA should contribute to the support of vulnerable university activities that they believe to be of importance to the SET base of the region.

The HE White Paper and regional SET capacity

5.22 The January 2003 HE White Paper⁴⁰ addressed research and knowledge transfer issues, and made proposals that have important implications for the regions. For example, HEFCE pointed out that “the White Paper indicated that funding in research as a whole is likely to be further concentrated around world-class excellence and thus increase the regional disparity” (p 283).

³⁹ The proposals for new RAE methodologies (see paragraph 5.25) should also help research growth where there is potential.

⁴⁰ *The Future of Higher Education*, January 2003, Cm 5735.

- 5.23 This has led to concerns — such as those articulated by the panel of HE knowledge-transfer professionals (QQ 158–163) and ONE (p 167) — that the SET base of the regions would be undermined through both under-funding and the drain of top-class scientists, engineers and technologists to more highly-rated research departments. It would reduce the opportunities for universities in some regions to build the critical mass necessary to underpin the growth of high-tech SET-dependent industries.
- 5.24 Furthermore, the NorthWest Science Council noted that, although the North West's private sector R&D was above the UK average, the public sector investment was much lower. Whilst welcoming the nationally increased public science investment⁴¹, the Science Council believed "that this further investment should be applied to building capacity in the regions" (p 146).
- 5.25 We generally welcome the HE White Paper's support for research developments and knowledge transfer. However, we share concerns such as those voiced by Professor Diana Green (Q 158) over the simplistic classification of universities as either research-intensive or non-intensive. In any event, the broad position taken by the White Paper now needs to be evaluated in the light of the review of Research Assessment under way as we finalised this Report⁴², the variety of funding streams now contemplated for university research⁴³, and the proposed allocation criteria.
- 5.26 It is important that national policies set out in *Investing in Innovation*⁴⁴ and the recent HE White Paper should be developed in ways that do not frustrate the Government's parallel emphasis on regional economic development. In view of the importance of SET in RDAs' Regional Economic Strategies, **we recommend that the Government should establish a forum for OST (including the Research Councils), RDAs and other key players, that meets regularly to address the impact of and synergy between national and regional SET investments and, as far as possible, harmonise them.**
- 5.27 As noted in paragraph 6.40, it may be that this forum should, with suitable extensions of the membership, be given oversight of the umbrella policy and strategy for the exploitation of SET recommended in paragraph 6.38.

ECONOMIC GAINS FROM SET INVESTMENT

- 5.28 Businesses need to harness SET for commercial purposes, and the pressure on universities to make money out of their intellectual assets will, as Ms Quest noted (Q 127), ensure a continuing dialogue between academia and industry without intervention from others. However, successive Governments have sought to increase the economic return from the UK's national investments in the SET base by bringing the two sides closer together.

Commercial Exploitation of Public Sector SET

- 5.29 Traditionally, those in the public sector SET base were not expected to pay particular attention to the potential commercial value of their discoveries. They operated either mainly within an academic environment, challenging the bounds of existing knowledge, or in an essentially applied environment (such as defence or agriculture),

⁴¹ See paragraph 5.5.

⁴² The four funding bodies for UK higher education issued in May 2003 the report commissioned from Professor Sir Gareth Roberts, *The Review of research assessment*, seeking views by September 2003 on the review and the recommendations that relate to the process of assessment. The text of the report and details of the consultation arrangements are available from www.ra-review.ac.uk/

⁴³ In May 2003, OST issued *The Sustainability of University Research: A consultation on reforming parts of the Dual Support System* seeking responses by 30 September 2003. The text of the document and details of the consultation arrangements are available from www.ost.gov.uk/policy/invest-innov.htm

⁴⁴ *Investing in Innovation: a strategy for science, engineering and technology*, July 2002 — text available on www.hm-treasury.gov.uk

addressing specific issues of national concern. It was not their job to find ways to develop those discoveries into commercial products.

- 5.30 With the increasing recognition of the importance of the public sector SET base as a source of commercial value, many policy initiatives have been taken to encourage such exploitation to bring benefit to the UK economy. For example, the Defence Diversification Agency was established to address the commercial exploitation of work undertaken for the MoD. The NHS has been encouraged to look at the commercial value of its work. Universities are also being actively encouraged to generate spin-out SET-based companies.
- 5.31 In short, the public sector SET base is increasingly expected to encourage the commercial exploitation of its SET discoveries and developments⁴⁵. As a result, awareness, capability and capacity has increased in the public sector SET base, and more exploitation and application of SET is occurring.

Technology Transfer from Universities

- 5.32 Many national and European schemes to stimulate Technology Transfer from universities have been introduced over the last 30 years. The Teaching Company Scheme (now Knowledge Transfer Partnerships) and LINK are examples. Such schemes are now supplemented by regional initiatives. They share a similar overall aim of improving supply-side access and services for technological innovation, and typically involve high transaction costs.
- 5.33 Given the importance of knowledge transfer, enterprise and innovation for RDAs and others, it is essential that these schemes be simplified and rationalised. We therefore applaud the Minister's aim to reduce the number of schemes from over 150 to under 20 (Q 396) and encourage DTI, in pursuing the review, to pay particular attention to recent developments and imperatives in the way universities organise themselves and in their regions.
- 5.34 The business support infrastructure also has a role to play in technology transfer, and the SBS and their Business Links are thus key partners. However, universities often find it difficult to interact with SMEs. For those that have their origins as university spin-outs there is rarely a problem as the contacts and tradition of interaction are well established. In other cases where there has been no previous contact, universities may appear distant and daunting, or the university may simply feel that working with a particular SME is likely to be too difficult or too costly in time or resources.

HEROBAC, HEIF and “Third Leg” Funding

- 5.35 The “Higher Education Reach–Out to Business and the Community” (HEROBAC) Fund was introduced in 2000 by HEFCE, with DTI involvement, to facilitate a more strategic approach to the interface between HEIs and business. The long-term aim was to recognise and entrench a third core area of professional work in universities, alongside teaching⁴⁶ and research, that encouraged HEIs' engagement with business and the community to support the growth of a strong economy. This third core activity is now also known as the “Third Leg” or “Third Stream”.
- 5.36 The Higher Education Innovation Fund (HEIF) followed⁴⁷, which combined a number of individual OST initiatives concerned with knowledge transfer (such as Science Enterprise Challenge and University Challenge) with HEROBAC. The January 2003 HE White Paper emphasised a more regional focus for HEIF to support economic development.

⁴⁵ This includes a more proactive approach to managing public sector IP — see also paragraph 5.47.

⁴⁶ Which includes professional training.

⁴⁷ A fuller map of these developments is provided in Table 5.1 of *Investing in Innovation*.

- 5.37 The corraling of various Government Department's schemes into an explicit funding stream for the development of Third Leg activity has certainly boosted HEIs' engagement with business. Indeed, the January 2003 HE White Paper⁴⁸ envisaged that, in a new and more diversified HE system, this relatively new explicit area of HEIs' activity would, for at least some institutions, become more important than basic research.
- 5.38 In contrast to the traditional core areas of teaching and research, however, the Third Leg does not yet have sustained core funding (nor, as discussed in the next section, does it have national esteem measures⁴⁹ to recognise quality provision). Reflecting a common and generally positive view of our witnesses from HE, business and RDAs, Professor Sir Gareth Roberts observed that:
- “the White Paper mentions the sum of £90m for this third stream of funding, which is less than ten per cent of money for research distributed via the RAE. This is still an inadequate counterweight, I suspect, to encourage people to focus principally on third stream funding. ... I personally think it ought to be at least double the £90m to make people sit up and take notice ... It should be additional.” (QQ 172, 175 & 176)
- 5.39 This lack of incentives makes it difficult for the HE sector as a whole to realise its potential in regional economic development. We therefore encourage HEFCE, DTI, and DfES to complete the establishment of the Third Leg as a core area of HEIs' work.

National Metrics for Knowledge Transfer

- 5.40 While the various schemes to encourage knowledge transfer have the common purpose to exploit SET effectively for economic growth, there is no obvious coherence or overall prioritisation in the many performance measures. Such coherence and prioritisation is vital if the different schemes are to be optimally reinforcing.
- 5.41 In addition, concerns were expressed that current metrics for Third Leg activities do not link with the objectives of the RDA. As Ms Caroline Quentin noted, the main measure of HEIs' success in interactions with business was the Higher Education–Business Interaction Survey (HE–BIS). However, this had only three and quite minor questions relating to HEIs' links with RDAs. In addition, only two of RDAs' 15 core Tier 3 targets had any direct relationship to the universities' SET base (QQ 137–139 and p 84).
- 5.42 It will be no easier to judge the effectiveness of university support for local industry than it is to judge the outcomes of RDA support for SET in their regions. Nevertheless, it is essential to try to do so — and, as this becomes a more important strand of university activity, such judgements will become the basis of funding allocations. The aim of producing such metrics is to ensure sustained commitment by HEIs to supporting business so that they develop the motivation, capacity, capability and commitment to interact professionally and effectively with regional development in all its breadth. Those metrics should take a more strategic approach than at present. They should provide incentives for HEIs, working with others as necessary, to become excellent at engagement with the business sector, and generally give a clarity of direction to help focus activity where it will make a difference in economic development.
- 5.43 Professor Sir Gareth Roberts made interesting suggestions for “performance polygons” as esteem measures for knowledge transfer (Q 172 and p 92) and we recommend that **HEFCE should work with the RDAs, the universities and other interested parties**

⁴⁸ *The Future of Higher Education*, January 2003, Cm 5735.

⁴⁹ As noted in paragraph 5.18, there is the RAE for research. Teaching is covered by the Teaching Quality Assessment (TQA).

to develop strategic measures to assess the effectiveness of knowledge transfer and other interaction between universities and business, to complement the national quality measures for teaching and research. The measures should recognise that:

- (a) the interactions will be of many different types;
- (b) engagement must not be constrained by regional boundaries; and
- (c) meaningful assessment will require a long-term and, in part, subjective view.

Commercial Activities of Universities

- 5.44 Some universities have fostered collaboration with industry over many years —most successfully when there have been shared research objectives. In some cases, this collaboration has provided a valuable stream of income for the university over a period when funding from the public sector was decreasing.
- 5.45 Many universities also actively encourage the formation of spin-out companies by university staff. Those commercial activities support the innovation agenda generally and RDAs' work in particular — although a university will generally seek out the best research links, whether within or outside its own region.
- 5.46 Many individual universities, helped and supported through various schemes, have established R&D Offices or the like to interface with business and the region. In some regions, that network is partly coordinated through the University Associations and by the RDAs. There are also national networks. It is not clear how effectively these interfaces are coordinated with RDA activities to provide easy access by businesses to the university SET expertise — both within their region and nationally. Nor is it clear how they interlink with intermediary agencies described in paragraph 4.29.

Intellectual Property Management

- 5.47 Intellectual Property (IP) comprises ideas or inventions that may lead to useful products or services. The identification, protection, management and use of IP are key aspects of technological innovation. Many small businesses and some universities have little experience in managing their IP. Failure to do so effectively may lead at one extreme to the loss of the IP and, at the other, to its not being exploited at all. The need for greater professionalism in handling IP is common ground, although there are differences about whether this would be assisted by more standardised processes.
- 5.48 Whatever the mechanism, one issue is the skill base for managing IP. NWDA is developing a regional support process (p 159) and, as Professor MacIntyre noted, NorthSTAR (out of Science Enterprise challenge) provides expertise in IP management linked to ONE's five Centres of Excellence (Q 156).
- 5.49 Having considered similar issues during our recent Inquiry into innovations in microprocessing, we recommended⁵⁰:

“that the Government should revisit general practice in exploiting intellectual property, with particular reference to the complex field of computing, and seek to establish principles that will lead to a greater uniformity of approach between Government Departments and Agencies, industry and universities.”

The thrust of that recommendation remains valid in this more general context.

RDA/UNIVERSITY RELATIONSHIPS

- 5.50 The newness of the RDAs means that their relationships with the universities are at a relatively early stage of development. In common with a number of witnesses, HEFCE stressed the need for RDAs to work even more closely with the HE sector at a strategic

⁵⁰ In paragraph 10.7 of *Chips for Everything: Britain's opportunities in a key global market*, 2nd Report Session 2002–03, HL Paper 13—I.

level (p 283). Their ability to do so is hampered by the “communication gulf between the language of science and the language of economic development” noted by Nottingham University (p 334).

- 5.51 Universities are well-established bodies, used to dealing with multi-million pound research contracts with both public bodies and the private sector. They have extensive networks and support organisations that manage their research and other contracts. It is to be hoped that this level of professionalism can be carried across into dealings with the RDAs, whose decision-making processes are seen by a number of witnesses as unnecessarily bureaucratic.

- 5.52 For example, the University of Newcastle upon Tyne noted:

“a distance between discussion with officers in the RDA and their project appraisal systems which introduces a high degree of challenge at the project level. Further, checks and balances are introduced through referral of major decisions to the DTI. This all adds up to a cumbersome and lengthy decision-making process compared with the research councils.” (p 332)

As neatly summarised by Dr Douglas Robertson, RDAs should “stop being contracting agencies and start being collaborating partners” (Q 129).

- 5.53 To improve the strategic and operational links between RDAs and the University sector, **we therefore recommend that each RDA should work with its regional university association to devise and put in place arrangements for closer strategic working that also minimise the bureaucracy of contracting arrangements.**

Clusters

- 5.54 As noted in paragraph 4.43, RDAs are encouraged to promote economic development through cluster policies. It is generally recognised that, proximity of businesses in the same general field (whether or not they are high-tech) can yield real benefits of mutual support. This is the rationale behind the science and technology parks that are to be found in many parts of the country, often supported or promoted by the RDA.
- 5.55 It is important that all clusters should derive the maximum benefit from the regional SET base, particularly but not exclusively that which is contained within the public sector. The public sector research base represents a huge knowledge and resource base in SET. Some of that science relates to business sectors or to key technologies for growth. Much of the specialist work that goes on in a region’s universities is likely to relate to the RDA’s key sectors. It is equally likely to be relevant outside the region, so a region’s businesses may also need to look more widely for SET expertise.
- 5.56 As noted in paragraph 5.17, a number of RDAs have mapped the strengths of the SET base in relation to their clusters. There does not, however, appear to have been any systematic mapping of the national SET base in relation to the key business sectors and clusters. This would be a valuable resource for both RDAs and businesses, and would also help strengthen the networking between the national SET base and the regions.
- 5.57 **We therefore recommend that RDAs should collaborate with their regional university associations to map the SET strengths of the universities in relation to key clusters, aggregating the results into a national resource by making them available on the web-enabled intelligence service recommended in paragraph 4.51.** A useful starting point for this would seem to be the Scottish Research Information Service (SRIS) which, as noted by UUK, provides a central point for businesses to find out about Scottish HEIs’ research expertise and opportunities (p 338).

CHAPTER 6: RESETTING THE REGIONAL/NATIONAL BALANCE

INTRODUCTION

- 6.1 As discussed in previous Chapters, the establishment of the RDAs has significantly altered the framework for the national drive to improve the exploitation of SET for economic growth.
- 6.2 This Chapter explores the new dynamics within the national and wider policy frameworks set by the Government and the European Union (EU). Against that background, we then discuss the ways in which those frameworks need to be adjusted to accommodate the growing regional stake in technological innovation.

POLICY BALANCES

National science investment

- 6.3 The national policy on science is focused on the development of an excellent SET base, based on peer review. This is overseen by OST and HEFCE, and delivered mainly through the universities. There is further national investment in science through the Public Sector Research Establishments and various Government Departments (e.g. Health, Defence and Environment, Food and Rural Affairs).
- 6.4 These investments in SET research are made from a national perspective. They concentrate on developing and maintaining the excellence of the science base. They take no obvious account of regional SET concerns or needs.

Investment in regional development

- 6.5 The national policy on regional economic development, overseen by the DTI on behalf of a number of Whitehall Departments, is delivered through the RDAs. As the primary purpose is economic development, no explicit priority is given to regional involvement in the SET base.

Exploitation of SET — the integrating agenda

- 6.6 Both National SET investment and regional development have an interest in the exploitation of SET for economic growth. While the interest is common, our Inquiry has shown that the different perspectives could be brought together more effectively.
- 6.7 SET exploitation falls within the broad general area of “Innovation”. National policy on innovation is championed by DTI, which recently restructured itself to form an Innovation Group. At the time of writing, the Department was part way through a joint review with HM Treasury on Innovation⁵¹ (underpinned by the Lambert Review of the Business–University interface⁵²).

Coherence

- 6.8 There is an obvious imperative to optimise public investment in SET. Although that optimisation is complicated by the wide variety of national and other bodies channelling funds into the SET base, we are clear that it is possible to do better.

THE DEVELOPING ROLE FOR RDAs

- 6.9 RDAs recognise their developing role in the national picture of SET. They interpret and deliver national policies in the context of their regions. Different regional demands

⁵¹ Details in the DTI Press Notice P/2002/752 of 27 November 2002 — see www.dti.gov.uk/innovation-group/pressrel-271102.htm

⁵² See www.hm-treasury.gov.uk/consultations_and_legislation/lambert/

mean that similar national strategies are expressed through different tactics in the regions, based on history, culture and ambition.

- 6.10 The RDAs' collective submission to the Inquiry (p 20) noted their increasing knowledge of regional and local SET strengths and the importance of their continuous involvement in both national SET policy development and in the development of regional research strengths. They also noted their emerging role in stimulating knowledge transfer, business development and wealth creation.
- 6.11 All RDAs wanted: to grow new industries in their regions; access to the SET base to underpin their strategies for economic growth; and to understand and draw on the key emerging technologies. They recognised SET investment as a powerful magnet for SET companies, and that a high-quality SET base underpinned SET exploitation and application in all its manifestations. Ideally, each RDA wants a strong basic science base, relevant to its Regional Economic Strategy, located in its region.
- 6.12 RDAs also acknowledged their role in coordinating and advising on Third Leg core funding and their role in skills development in relation to SET. Furthermore, they emphasised the importance of performance measurement that accommodates the longer term view needed to assess the impact of SET exploitation on economic performance.
- 6.13 However, as shown by our recommendations in previous Chapters, the framework for RDAs' delivery of their remit can be much improved.

Regional/National coherence in SET

- 6.14 A general point emerging from our Inquiry is the need for national organisations and funding agencies (such as the Research Councils, HEFCE and DTI) — while maintaining their specific focus and mission to secure excellence — to make their SET investments with an awareness of the regional dimension. In return, there is an equal need for RDAs to relate what they are doing to national developments.
- 6.15 This is true for both investment in the SET base and in mechanisms for its exploitation. Each area of responsibility and each funding agency should maintain its distinctiveness. But they should be aware of potential synergies at national and regional level, and then follow those through to ensure the different regions benefit. This should overcome concerns about different initiatives overlapping — or even acting against each other.
- 6.16 Some of our witnesses felt there was a natural presumption on the part of funding bodies that SET facilities serving national needs should be in the South East. For example, NWDA suggested that Whitehall tended to see provision as "national" if made in London or the South East but "regional" if made elsewhere (Q 299). While noting that perception, we received no hard evidence that this was the case. Moreover, we observe that the South East has a relatively high proportion of the national population and, for historical reasons, is also home to a number of distinguished research institutions.
- 6.17 The key criterion in allocating funding in pursuit of SET excellence must clearly be merit. Even so, we believe that it is possible to take regional considerations into account in national resource allocation without compromising quality. Given the relatively small size of the country and the nature of modern communications, we would go further and say that regional considerations should never be dismissed out of hand, hence our recommendation in paragraph 5.26: as Sir Ian Gibson noted, even globally significant provision has to be located somewhere (Q 269). Any perceived gap between national and regional levels will also be reduced by making user-friendly information about the location of SET expertise widely available, as recommended in paragraph 4.51.

Coherent SET across Government Departments

- 6.18 The topic of our Inquiry, “Science and the RDAs”, crosses a number of Whitehall Departmental boundaries. That spread of involvement has led to some lack of coherence, confusion and even contradictions. For example, as SURF noted, the proposal in the January 2003 HE White Paper⁵³ to create 6* research departments with compensation for non-research intensive institutions by allocating a regional role “not only contradicts the principles of regional polices, but is inherently dangerous for the future of the science base itself” (p 270). We acknowledge the Government’s attempts to minimise the impact of Whitehall boundaries but, as noted in previous Chapters, there remains significant room for improvement.
- 6.19 A consistent thread in our evidence is that the major priority of science policy (manifest in, for example, the work of the Research Councils and HEFCE) must be to build and maintain excellence of the SET base in the UK. There is also general acknowledgement that maintaining the excellence of that SET base should be primarily the responsibility of the SET research community. Their knowledge, experience and understanding gives them the credibility to judge quality. The role of the RDAs is to work with that quality-assured SET base to help ensure its effective exploitation.
- 6.20 As SURF noted, consideration of regional needs within national science policy does not have to subvert the principle of scientific excellence (p 270). The question is not the dilution of SET quality but of its effective connection with the processes of exploitation.

RDA perspectives

- 6.21 With their brief to generate regional economic prosperity, RDAs have to make sense of SET-related policies from different Whitehall departments and from Europe, and manage them to ensure that they work coherently in a regional context. They are, indeed, uniquely placed to see where such policies and approaches positively reinforce, overlap and even act against each other.
- 6.22 It has become clear to us that the various policy strands are not always working in a positively reinforcing way. Given the importance of SET in economic development, RDAs must be given a coherent framework in which to operate, acting as real partners in the development of effective exploitation policies.

Focus for coherence

- 6.23 For coherence to be achieved, there must be the right balance between regional and national perspectives, and between the strategic and the operational. The present lack of coherence is underlined by various questions which arose from our Inquiry, such as the following.
- (a) How does national investment in SET and Centres of Excellence link in with Regional Development?
 - (b) How can RDAs best build the role of such Centres into their incubation activities, their cluster developments or their Innovation Strategies?
 - (c) Where and how do investments in fundamental science (such as by NWDA and DTI at Daresbury⁵⁴) have relevance for other regions? And how is that expertise accessed across the country?
 - (d) Where and how are SET-related interests of the different Government Departments brought together?
 - (e) How are European funds maximised?

⁵³ *The Future of Higher Education*, Cm 5735, January 2003.

⁵⁴ See paragraph 4.33.

(f) What are the implications of RDAs investing in SET?

- 6.24 Coherence is, of course, greatly helped by having a limited number of performance measures — relating to outcomes rather than processes — that are common to the various stakeholders. Coherence is also served by reducing bureaucracy, examining overlap, addressing State Aid rules, and exploring where and how national and regional and EU investments can operate synergistically to give greater impact and gearing.

BETTER INTEGRATION OF NATIONAL AND REGIONAL SET

- 6.25 A clear message from our witnesses was the need for a stronger integration of regional and national activities in relation to SET and its exploitation.
- 6.26 From the RDA perspective, ONE strongly supported a regional dimension to national SET policy, but saw national co-ordination as necessary to ensure that national objectives were met and duplication avoided. They believed this could be achieved by the RDAs working with national funding bodies (p 139). NWDA wanted to become participants in national science policy formation and less processors of Government funds. They also wanted to see regional capacity building in SET as part of the criteria in determining the disposition of Government spend on SET (p 154). CURDS reinforced the point, citing Foresight as:

“a good example of a policy which lacks a strong regional dimension, by focusing on national priorities. Although there have been Regional Foresight exercises, their impact has been limited because they either seek to persuade firms to pursue particular technological avenues identified as national priorities, or they lack the resources and purchase on policy to address regional industrial priorities.” (p 275)

- 6.27 From industry, Rolls Royce plc said it was not clear whether RDA strategies were adequately influenced by and integrated with the national picture. The links between the developing strategies of DTI, the Engineering and Physical Science Research Council (EPSRC) and MoD and the role of RDAs should be made clearer (p 330⁵⁵). The Royal Academy of Engineering argued that each region should, in close conjunction with regional industry, be allowed to develop its own SET strategy and fund it appropriately, albeit with some level of national coordination (p 309).
- 6.28 From the academic community, SURF noted the increasingly key role for RDAs in implementing national policy on SET exploitation for wealth creation “but Government thinking on RDAs and science policy remains muddled and disjointed” (p 270).
- 6.29 In the development of EU science policy, recent policy statements have stressed the importance of regions in the mobilisation of R&D, to encourage the growth of innovative firms and their integration into a European research area. To support innovation there is a need for meshing policies at local, national and European levels.
- 6.30 The development of Science (and Industry) Councils in the regions is beginning to address the gap between national and regional perspectives. Although those Councils have significant potential, there still remains the question of integrating their work with national imperatives.

National innovation framework

- 6.31 The establishment of RDAs and the importance of SET in their Regional Economic Strategies has changed the national dynamics. That change needs to be accommodated by a more coherent framework for the development and delivery of innovation.

⁵⁵ Part of the evidence submitted by the Society of British Aerospace Companies (p 327).

- 6.32 The lack of coherence in all this is underlined by the number of reviews⁵⁶ under way to address this area. The Society of British Aerospace Companies commented that “the proliferation of such reviews, and the perceived absence of significant change on the ground is a reflection of the lack of a national innovation strategy”. The Society further noted the danger of policy fragmentation if the coherence was not directly addressed, and that the application and exploitation of SET was too important to leave the necessary coherence to chance (p 327).

A NATIONAL FRAMEWORK FOR EXPLOITING SET

- 6.33 We are clear that there must be a coherent framework for addressing the application and exploitation of SET at both national and regional levels. This would help to ensure that sensible and appropriate alignments are in place between the different policy areas of science, innovation, HE and RDAs — all with the common aim of improving economic performance.

Current approaches

- 6.34 The Government’s 2002 policy statement *Investing in Innovation*⁵⁷ is a useful starting point in the development of a national framework for SET exploitation, but it could do more to address the longer term direction of SET exploitation, and the regional/national balance.
- 6.35 Whitehall Departments are aware of the need to secure coherence in this broad area. For example, references to RDAs’ roles were made in *Investing in Innovation* and in the January 2003 White Paper on *The Future of Higher Education*⁵⁸; RDAs meet the Research Councils annually; and the Innovation Network, run through the DTI, involves the RDAs and representatives of the Development Agencies in Scotland, Wales and Northern Ireland.
- 6.36 The RDAs also meet each other and work collaboratively in areas of common SET interest such as establishing a Nanotechnology Centre. OST indicated that the Research Councils have to address the exploitation of their research (Q 45) and that the Public Sector Research Establishment Fund was set up (with £10m in 2001 and a further £15m in 2002 for 2004–6) to encourage such exploitation (p 17). The HE sector has a number of organisations — such as the Universities Companies Association (UNICO) and the Association for University Research and Industry Links (AURIL) — that address knowledge transfer and company spin-out.

Future directions

- 6.37 National leadership is required on the exploitation of SET to provide the right drivers and processes for the exploitation of SET for economic gain. That leadership should not only provide a structure but also deliver a focused policy and strategy that successfully integrates the different perspectives — the national science base, the business community, the RDAs and the emerging Science Councils — into a coherent and powerful SET exploitation strategy.
- 6.38 Accordingly, we recommend that, as a priority, the Government should involve relevant national and regional players in devising and implementing — by the end of 2004 — a national policy and strategy for SET exploitation that, with a carefully tailored set of common outcome measures, truly integrates national and regional perspectives. The emphasis should be on outcomes rather than process and, as discussed in the lead up to our recommendations on paragraph 3.28, the overriding

⁵⁶ Such as those noted in paragraph 6.7.

⁵⁷ *Investing in Innovation: a strategy for science, engineering and technology*, July 2002 — text available on www.hm-treasury.gov.uk

⁵⁸ Cm 5735, January 2003.

- need is for monitoring the impact on economic performance through a few relevant measures over appropriate timescales.
- 6.39 This new approach would give coherence to SET exploitation for economic impact by addressing, for example:
- (a) national and regional perspectives on SET research and its exploitation;
 - (b) formal linkages between the SET Research base and Science Councils in the Regions, and relevant Whitehall departments;
 - (c) SET investments and its exploitation in relation to clusters;
 - (d) metrics for impact and accountability;
 - (e) communication flows;
 - (f) clarification of the different players' roles, responsibilities and interconnections;
 - (g) private and public sector interests;
 - (h) capacity for SET exploitation in universities and in business; and
 - (i) strategic vision for national SET exploitation.
- 6.40 The strategy should be overseen by an appropriate national body, to include significant business representation. Given the interrelationship with the regular assessment of national and regional SET synergies recommended in paragraph 5.26, the new forum proposed for those purposes (with adjustments in the suggested membership) might usefully take on this task.

CONCLUSION

- 6.41 RDAs are relatively new organisations. In paying increasing attention to the role of SET in their economic strategies, weaknesses and opportunities have become apparent within the structures intended to encourage and support economic development.
- 6.42 Some of those weaknesses are relatively minor matters of process. Others are more deep-seated. That is not because policy levers are missing — indeed, there are too many policies. It is because the present arrangements lack the coherence necessary to enable those levers (rationalised as necessary) to operate in harmony. We have made recommendations throughout our Report to address these matters⁵⁹. For ease of reference, they are gathered together in Chapter 1.
- 6.43 As a nation, we must capitalise on the momentum engendered by the RDAs in their early years. As indicated by the title of our Report, SET needs to be an explicit and integral part of the regional agenda. Putting in place now the required new structures and appropriate common outcome measures will help ensure our national prosperity in the increasingly challenging years to come⁶⁰.

⁵⁹ As noted in paragraph 1.17, we hope the extensive evidence base published in Volume II of this Report will provide a valuable resource for the Government and others as they pursue our various recommendations.

⁶⁰ As noted in paragraph 1.4, we are minded to make a further study of this area in about five year's time to see what progress has been made in these important matters.

APPENDIX 1: SUB-COMMITTEE II

MEMBERSHIP

The members of the Sub-Committee which conducted this Inquiry were:

Baroness Finlay of Llandaff
 Lord Freeman (co-opted)
 Lord Lewis of Newnham
 Lord Methuen
 Lord Mitchell
 Lord Oxburgh
 Lord Patel (Chairman)
 Lord Thomas of Macclesfield (co-opted)
 Lord Turnberg
 Lord Wade of Chorlton
 Lord Winston
 Lord Young of Graffham

DECLARATIONS OF INTEREST

Members declared the following interests in relation to the Inquiry.

Baroness Finlay Vice Dean at University of Wales College of Medicine.

Lord Freeman..... Chairman, Thales plc; Director, Thales S.A.; Chairman, PricewaterhouseCoopers Corporate Finance Advisory Board.

Lord Mitchell Chairman, Syscap plc; Trustee, eLearning Foundation.

Lord Oxburgh Member, Cambridge-MIT Advisory Council; Chairman, SETNET.

Lord Thomas..... Chairman of the NorthWest Development Agency, 1998–2002; Chairman, Internexus Group.

Lord Turnberg..... Professor at the University of Manchester until 1997; Dean of the Faculty of Medicine in 1980s; a member of the North West Regional Health Authority.

Lord Wade President, Campus Ventures Ltd, Incubation Unit, Manchester University; Chairman of Rising Stars Growth Fund Ltd, of the Advisory Committee to Rising Stars Growth Fund and of NIMTECH.

Lord Young..... Chairman of Council, University College London; President and Director, The West Sussex Economic Partnership Ltd; Chairman, Prince's Trust Development Board; former Secretary of State for Employment (1985–87) and for Trade & Industry (1987–89).

SPECIALIST ADVISER

The Sub-Committee appointed Marilyn Wedgwood BSc MSc PhD FRSA as its Specialist Adviser. Currently Pro-Vice-Chancellor and Director of External Relations at Manchester Metropolitan University, Dr Wedgwood has long experience of regional policy matters having also been, among other things: Director of Enterprise in Higher Education and then of Regional Affairs at the University of Sheffield; an adviser to the then CVCP⁶¹ on Regional Policy; and a part-time secondee to DTI's Innovation Unit to assist in the development of the interface between HE and business.

⁶¹ Now succeeded by Universities UK.

APPENDIX 2: CALL FOR EVIDENCE

The following Call for Evidence was issued on 16 January 2003, inviting written submissions by 24 February.

1. The House of Lords Science and Technology Committee has appointed Sub-Committee II, chaired by Lord Patel, to conduct an Inquiry into Science and the Regional Development Agencies (RDAs).
2. The nine RDAs in England spend and mobilise significant sums on science-related matters. The Sub-Committee is interested in the diversity of approaches that have developed and, in the interests of spreading best practice, wishes to identify those that have been most successful. In doing so, the Sub-Committee intends also to make comparisons with the more established practice in the Devolved Administrations and in other countries.
3. Against that background, the Sub-Committee would welcome comments on the following questions (not all of which will be relevant for some respondents).
 - a. How and to what extent do RDAs develop and exploit science, engineering and technology (SET) to stimulate employment, employment opportunities, regeneration, wealth creation and improved skill levels?
 - b. How do advances in SET and national SET policies and initiatives influence and inform RDAs' strategies?
 - c. Do RDAs take full advantage of all available local, regional and national SET facilities, expertise and funds (including EU funds) in implementing their policies?
 - d. How do RDAs reach decisions on financial support for SET? How should success be judged?
 - e. What lessons may be learned from RDAs' approach to SET, and from the longer experience of Scotland, Wales and Northern Ireland?
4. The Sub-Committee would also welcome wider comment on these matters.

APPENDIX 3: WITNESSES

The following witnesses gave evidence. The marks ●, ♦ and ■ indicate witnesses that gave oral evidence — those marked ♦ as part of the panel of HE knowledge-transfer professionals on 11 March 2003, and those marked ■ as part of the high-tech business panel on 25 March 2003.

All the evidence is Printed in Volume II except for that marked ○ which may be inspected at the House of Lords Record Office (telephone 020 7219 5316).

- Mr Paul Abbott, Bolton Technical Innovation Centre
- Advantage West Midlands (AWM)
 - AMICUS—AEEU
 - Association of Independent Research and Technology Organisations (AIRTO)
 - Association for University Research and Industry Links (AURIL)
 - Professor Peter Barrett, University of Salford
 - BioCity Nottingham Ltd
 - Bioindustry Association
 - Bioindustry Association, Scotland
 - British Embassy, France
 - British Embassy, Germany
 - British Embassy, Japan
 - British Embassy, United States of America
 - British High Commission, Canada
 - British Library
 - Dr David Brown, Arthur D Little Ltd
 - Centre for Sustainable Regional Futures (SURF), University of Salford
 - Centre for Urban and Regional Development Studies (CURDS), University of Newcastle
 - Department of Trade and Industry (DTI) and the Office of Science and Technology (OST)
 - Department for Education and Skills (DfES)
 - East of England Development Agency (EEDA)
 - East Midlands Development Agency (EMDA)
 - East Midlands University Association
 - English Nature
 - Enterprise Ireland
 - European Commission
 - Mr John Gavan, Enterprise plc
 - ♦ Professor Diana Green, Sheffield Hallam University
 - Higher Education Funding Council For England (HEFCE)
 - Institute of Food Science and Technology
 - Institute of Physics
 - Invest Northern Ireland
 - Dr James Keaton, Campus Ventures
 - Let's TWIST Partnership
 - Mr Doug Liversidge, Quest Investments Ltd
 - London Development Agency (LDA)
 - ♦ Professor John MacIntyre, University of Sunderland

- North East Science and Industry Council
- NorthWest Development Agency (NWDA)
- NorthWest Science Council
 - North West Universities Association
- One NorthEast (ONE)
 - Oxford Innovations Ltd
 - ◆ Dr Christopher Padfield, Cambridge University
 - Pera International
 - ◆ Dr David Prior, University of Liverpool
 - ◆ Ms Caroline Quest, King's College, London
- Mr Bernard Quigg
 - Research Councils UK
- Professor David Rhodes, Filtronic plc
- Professor Sir Gareth Roberts
- ◆ Dr Douglas Robertson, University of Newcastle Upon Tyne
 - Royal Academy of Engineering
 - The Royal Society of Edinburgh
 - Scottish Enterprise
 - Society of British Aerospace Companies
- South East Development Agency
- South West Regional Development Agency (SWRDA)
- Dr Steve Toon, Medeval Ltd
 - University of Leeds
 - University of Newcastle upon Tyne
 - University of Nottingham
 - University of Sheffield
- University of Sussex
 - Universities UK
 - Welsh Development Agency (WDA)
 - West Midlands Higher Education Association
- Mr Peter Wren-Hilton, HB Internet Ltd
- Yorkshire Forward
 - Yorkshire Universities

APPENDIX 4: VISIT TO ADVANTAGE WEST MIDLANDS

1. Members of the Sub-Committee visited AWM, the Regional Development Agency responsible for the West Midlands, at Birmingham on 29 January 2003. The purpose of the visit was to see at first hand the way that RDAs interact with regional partners on the ground.
2. The visiting party consisted of Lord Patel (Chairman of the Inquiry), Baroness Finlay of Llandaff, Lord Methuen and Lord Thomas of Macclesfield. They were supported by the Specialist Adviser to the Inquiry (Dr Marilyn Wedgwood), Clerk (Mr Roger Morgan) and Assistant Clerk (Mr Gordon Baker).

INTRODUCTORY BRIEFINGS

3. The party was welcomed to AWM's headquarters in Birmingham by the Chief Executive of AWM (Mr John Edwards). He and two AWM Board Members (Professor Kumar Bhattacharya⁶² and Mr Norman Price), several senior executives of AWM and members of AWM's Regional Innovation Strategy Steering Group gave presentations on AWM's strategy and activities⁶³. The following were among the principal points made.
 - a. AWM covered the counties of Warwickshire, Worcestershire, Herefordshire, Shropshire and Staffordshire. This was a diverse area of 13,000 square kilometres, with a population of 5.27 million and a GDP of over £60 billion. Much of the Government funding inherited by AWM on the establishment of RDAs in 1999 had been committed to various regeneration priorities. With the ending of those commitments plus the aggregation of separate budgets into a "single pot", the Agency (whose budget for 2002/03 was £192.2 million) now had more scope and flexibility to tackle innovation strategy. EU funding could play an important part in this and was being actively pursued through AWM's representation in Brussels.
 - b. AWM's role was to take the lead in developing a diverse and dynamic business base, promoting learning and skills, creating conditions for growth and regenerating communities. The fundamental objective was to create more and better jobs and better quality of life in the West Midlands. The Agency did not, of course, act in isolation. Its aim was to be a catalyst: bringing together leaders of business and HE; carrying out market research; providing substantial seed corn funding; stimulating investment; and generating a new sense of regional commitment, collaboration and confidence in seizing economic opportunities. Its strength lay in local knowledge and commitment and in being business-led.
 - c. The region's strength had been built on vocational skills, but graduate retention had been below average. Science was an economic driver and AWM saw it as an important means of achieving its strategy, both through research generating new products and processes and by enriching the regional skills base. It was important to increase scientific awareness in the industrial and financial communities. Science could find new applications for traditional industries, as well as generating completely new business opportunities. But cultures needed to change: many businesses were relatively risk-averse while academic traditions tended to prize scientific endeavour for its own sake, rather than for its commercial potential.
 - d. Three high technology corridors had been identified for cluster development based on centres of excellence in universities, research establishments and both traditional and new industries. AWM's strategic priorities were nanotechnology, polymers, photonics, medical sciences, advanced engineering, transport design, ICT, e-

⁶² Knighted in the Birthday Honours 2003.

⁶³ AWM subsequently submitted written material to the Inquiry and, on 4 March 2003, also gave oral evidence (see pages 24, 49 and 65 of Volume II).

learning, microsystems commercialisation and developing space for new high technology business.

- e. Five traditional business sectors were targeted for concentration: transport and building technologies, food and drink, tourism and leisure and high-value consumer products. The new target sectors were specialised business services, information and communications technologies and environmental technologies. AWM also saw scope for developing interactive media for education and entertainment and new medical technologies derived from the ownership of IP by NHS trusts.
- f. The “Spinner” project was designed to help local universities and business exploit patenting and IP opportunities and provide start-up capital for new technologies. Other AWM schemes also helped to generate start-up capital. However, in the current economic climate, SMEs had difficulty in finding enough finance to carry higher technology projects through to the point where commercial viability could be demonstrated and longer-term financial backing secured. More long-term funding was needed.
- g. English regions and their institutions had traditionally tended to compete with one another for funds, commercial advantage and attention. However, AWM felt that dialogue and information-sharing within and between regions was improving. RDAs realised that a more co-operative approach could avoid duplicating effort or missing opportunities, and create synergies.
- h. AWM was actively promoting the rapid improvement of broadband connectivity throughout the region. The region’s road and rail infrastructure were also a serious constraint on development, but AWM was able only to lobby about the inadequacies.

AUTOMOTIVE RESEARCH

- 4. Mr David Blake, AWM’s Acting Director of Business Growth, Dr Alan Curtis of the Warwick Manufacturing Group and Mr Barry Webb of Land Rover briefed the visiting party on progress towards establishing a new Premium Automotive Research Centre for the Region⁶⁴. If the West Midlands was to retain a stake in car manufacture, it was clear that new skills and techniques would be required as new materials were introduced, particularly at the premium end of the market.
- 5. AWM saw the initiative as a good example of an RDA’s role as a facilitator, in this case by linking regional university-based research with local automotive manufacturers and their suppliers. Each of the partners was planning a substantial investment in the centre, aiming also to leverage other funds for particular projects. Apart from the intrinsic value, AWM expected to see wider economic and social benefits as the Centre’s impact was felt throughout the supply chain.

HE PERSPECTIVES

- 6. The Vice-Chancellor of Birmingham University, Professor Michael Sterling, kindly hosted a working lunch at the University to enable the visiting party to meet senior figures involved in the region’s HE⁶⁵. Among the key points made were the following.
 - a. The HE community in the region was already feeling the benefit of AWM’s work and valuable partnerships had been formed. In particular, AWM’s high technology corridor concept had much to offer universities and research centres. However, research could not be confined regionally. Indeed, even within the region, the corridors tended to be knowledge-based, rather than strictly geographical.

⁶⁴ The “International Automotive Research Centre” was formally announced on 2 April 2003, see the supplementary memorandum from AWM on page 65 of Volume II.

⁶⁵ Many of those present were members of the West Midlands Higher Education Association which subsequently submitted written evidence to the Inquiry (see page 347 of Volume II).

- b. Shortage of university funds left little scope for long-term investment. This made partnerships with business difficult to broker, especially when smaller businesses had little money to contribute. RDAs should explore more imaginative solutions, such as helping to create strategic joint posts where graduate researchers could divide their time between working for business and pursuing research for higher degrees.
- c. Undergraduate engineering courses lacked an effective national strategy. Although this was a national issue, RDAs might help to advise the Government on how course re-structuring could make science and engineering students more aware of entrepreneurial culture and commercial possibilities.
- d. Universities should work with RDAs to remedy the shortage of managers capable of running joint cluster projects. RDAs could also help to make secondary science education more interesting and relevant to the business environment.
- e. RDAs had useful autonomy to pursue business-led strategies. If and when they became answerable to Regional Assemblies, care would be needed to avoid politicisation of RDA strategies.

NANOTECHNOLOGY

- 7. After lunch, the visiting party toured Birmingham University's Nanotechnology Centre and was briefed on its work by Professor Graham Davies and his colleagues. Because of its significance in the region and beyond, AWM was actively involved in supporting the Centre and extending its reach further.
- 8. Given the regional strengths, AWM was also working closely with the Centre and others (including other RDAs) in the bid for the Centre to accommodate the Government's proposed National Microsystems and Nanotechnology Manufacturing Centre. While being a national resource, that development would be of great significance for the region.

LEARNING AND SKILLS

- 9. Finally, the visiting party met representatives of further and higher education establishments and other relevant regional organisations to discuss the skills needed to support the emerging cluster and technology areas. They welcomed AWM's support of initiatives (articulated in the required FRESA) to develop learning and skills and make the culture of HE more receptive to entrepreneurship.
- 10. It was hoped that RDAs might do more, in partnership with others, to address the shortage of science and engineering students. Effective action on this needed also to include pre-16 education in which RDAs had no formal role.

ACKNOWLEDGEMENTS

- 11. Members endorsed the Chairman's thanks to AWM for hosting the visit, and to all those involved in the various sessions which had been very helpful in clarifying the issues to be addressed in the Inquiry.

APPENDIX 5: VISIT TO SCOTLAND

1. To help understand the issues arising from the Inquiry into the recently established RDAs in England, members of the Sub-Committee visited Scotland on 6 and 7 February 2003 to see how essentially the same matters were handled by the longer established Scottish Enterprise⁶⁶ and its partners.
2. The visiting party comprised Lord Patel (Chairman of the Inquiry), Lord Freeman, Lord Methuen, Lord Mitchell, Lord Oxburgh and Lord Thomas of Macclesfield. They were supported by the Specialist Adviser to the Inquiry (Dr Marilyn Wedgwood), Clerk (Mr Roger Morgan) and Assistant Clerk (Mr Gordon Baker).

SCOTTISH ENTERPRISE

3. The party was welcomed to the headquarters of Scottish Enterprise in Glasgow by Mr Charles Woods, Senior Director, Knowledge Management, and Dr Janet Brown, Director of Competitive Business, Science and Commercialisation Initiatives. They explained that Scottish Enterprise was formed in 1991 by merging the former Scottish Development and Training Agencies. Its remit covered lowland mainland Scotland, and 93% of the population. (The remainder was the responsibility of Highlands and Islands Enterprise.) Many of Scottish Enterprise's skills responsibilities — and it had recently taken over responsibility for the Scottish careers service — were exercised through 12 wholly-owned Local Enterprise Companies.
4. The general direction of Scottish Enterprise's strategy was set by the Scottish Executive via the Department of Enterprise, Transport and Lifelong Learning. The agency worked closely with Scottish business, academic institutions, local councils and the Scottish Higher Education Funding Council (SHEFC). It acted mainly as a catalyst and facilitator for long-term structural change by helping to create an atmosphere conducive to higher-value investment and fostering working partnerships to maximise Scottish resources and talents.
5. 80% of Scottish Enterprise's annual budget of some £500 million came from the Scottish Executive. Although EU funding had been of great benefit in developing and regenerating Scotland over the years, and was being actively pursued in Brussels, it currently provided less than £20 million of the total annual budget. Although difficult to quantify, the agency aimed to leverage substantial funding from other sources.
6. Key problems for Scotland and the agency included the decline of traditional industries, population migration, graduate retention, an ageing workforce, shortage of modern skills, and the need for urban regeneration and improved communications. Although Scotland had excellent universities and strong research, this was not matched by the industrial base. To help counter this, the agency pursued cluster development programmes focussed on biotechnology, optoelectronics, microelectronics, energy, food and drink, forestry products, tourism and creative media.
7. A complementary and new initiative was the establishment of Intermediate Technology Institutes (ITIs) focused in the three areas of energy, life sciences and communications/digital media markets where Scotland had acknowledged strengths. Run in collaboration with industry and academic institutions, these would be hubs for commissioning and supporting pre-competitive research in anticipation of future market opportunities.
8. Other significant Scottish Enterprise initiatives related to science, technology and innovation included:

⁶⁶ Scottish Enterprise subsequently submitted written evidence to the Inquiry (see page 312 of Volume II).

- a. a £30 million Proof of Concept Fund to support early-stage R&D and underpin its rapid commercialisation;
- b. Enterprise Fellowships, run jointly with the Royal Society of Edinburgh (RSE), to back up to 80 academics in forming spin-out companies;
- c. Project ATLAS to improve digital connectivity and other e-business links throughout Scotland; and
- d. a portfolio of funding schemes to encourage innovation by SMEs.

SCOTTISH EXECUTIVE

9. Mr Andy Bishop and Mr Tom Tumilty, of the Science and Higher Education Research Team in the Scottish Executive's Department for Enterprise, Transport and Lifelong Learning, briefed the visiting party on the Scottish strategy for science. The first milestone had been the Executive's January 2001 *A Science Strategy for Scotland*, developed over two years, with the assistance of a professional advisory group. This now provided the general framework for SET matters.
10. To help fill out that framework, the Executive had established the Scottish Science Advisory Committee in May 2002. To underline the Committee's independence, it operated under the auspices of the RSE. The Committee's challenging remit for its first year was to advise on what the science priorities should be in Scotland.
11. Not all science responsibilities had been devolved to the Executive: the Research Councils still operated on a UK-wide basis. In addition to the Executive's explicit science programmes, significant contributions to scientific development in Scotland also came from education policies and from spending by other bodies such as the NHS and the Scottish Agriculture and Fisheries Agencies. To help monitor all these interrelationships, senior officials met regularly in a cross-cutting science group.

THE ALBA CENTRE

12. On the afternoon of 6 February, the party visited the Alba Centre at Livingston. Members were welcomed by the Director, Neil Francis. He explained that the Centre had been established in the late 1990s on land purchased by the Scottish Executive and was run as a joint venture campus with a commercial developer. Strategically located close to leading universities and high technology companies in "Silicon Glen", it was intended to generate a critical mass of electronic design specialists and facilities with the vision of developing Scotland as a world centre of microelectronic product design and technology.
13. Among the Centre's core activities were the Virtual Component Exchange, the Scottish Embedded Software Centre and a microelectronic test centre which were providing advanced design, product development and IP services to companies within Scotland and beyond. The Centre was also an incubation centre: Convergent Technologies had been recently set up there as a joint venture between Scottish Enterprise and Medical Marketing International to commercialise parallel biotechnology and electronics research.
14. Another key component of the Centre was the Institute for System Level Integration (ISLI). The Chairman of the ISLI Board, Ron Dunn, explained that this was a joint venture between Scottish Enterprise and four Scottish universities (Edinburgh, Glasgow, Strathclyde and Heriot-Watt). The initial emphasis had been on providing professional development through MSc courses in system level integration, an engineering doctorate in electronic design and professional development courses in systems integration and semiconductor engineering for full-time, part-time and distance-learning students. Courses were run in partnership with industry. The doctoral students were all sponsored by companies, not all of which were Scottish-based, and spent half of their time doing research for those companies. 75% of the MSc students were from overseas.

15. Alongside these courses, ISLI was also building up its information, test and research services — all of which were helping establish its international reputation. ISLI recognised the need to broaden the base of its activities yet further, and welcomed the opportunities flowing from the recommendation for a UK-wide institute for System-on-Chip design arising from the Select Committee's recent Inquiry into innovations in microprocessing⁶⁷.

ROYAL SOCIETY OF EDINBURGH

16. The RSE hosted a dinner on 6 February to enable the party to meet Fellows of the Society and members of the Scottish Science Advisory Committee. In welcoming members of the visiting party, the RSE's Vice-President⁶⁸, Professor Andy Walker, noted that RSE membership was not (like the Royal Society of London) limited to scientists but was drawn from those pre-eminent in all aspects of Scottish life. The RSE was therefore well-placed to observe the interface between science and the economy⁶⁹.
17. During a round-table discussion, the following main points were made.
- a. It was useful that the Scottish Executive had a single Department covering enterprise and HE, but there was a long way to go before there was an integrated strategy. The Scottish Science Advisory Committee was still in its early days, and had not yet addressed the relationship between the science base and the economy.
 - b. The different horizons of development agencies on the one hand and universities and research institutes on the other meant that they were not natural bedfellows. Mechanisms were needed to encourage joint working. One opportunity arose from the absence of a strong pull on the science base from Scottish industry, although it was not yet clear whether the ambitious new Intermediate Technology Institutes would deliver all that was expected.
 - c. The Scottish Enterprise Proof of Concept scheme was seen as valuable in helping ideas get to the stage of securing IPR (the management of which, as elsewhere in the UK, was not without complications) and the next stage of funding.
 - d. Turning to schemes operated by RSE with Scottish Enterprise funding, the Enterprise Fellowships were valued as helping to generate a greater enterprise culture. However, these did not cover overheads and, although prestigious, thus required subsidy by the universities. The Technology Ventures scheme was also valued.
 - e. Although Scottish Enterprise and its predecessors stretched back over much longer than their English counterparts, the initial aim had been to attract inward investment. Experience of stimulating home-grown enterprise was rather less. It was important for Scottish Enterprise and the Executive to recognise fully that innovation involved real risk and was, in any case, hampered by bureaucracy which should be kept to the absolute minimum.
 - f. It was also important to recognise the Executive's and the development agency's roles in stimulating the science base through education and training at all levels.

HE PERSPECTIVES

18. In the first of three meetings held at the RSE on 7 February, Professor John Archer, Principal and Vice-Chancellor of Heriot-Watt University and Convenor of the

⁶⁷ See Chapter 8 of *Chips for Everything: Britain's opportunities in a key global market*, 2nd Report Session 2002–03, HL Paper 13—I.

⁶⁸ The RSE's President, Lord Sutherland of Houndwood, was detained in London on Parliamentary business and had sent his apologies

⁶⁹ The RSE subsequently submitted written evidence to the Inquiry (see page 310 of Volume II).

Universities Scotland Research and Commercialisation Committee made the following main points.

- a. Scottish universities had emphasised the importance of being embedded within the wider UK research community. Dual funding from the UK Research Councils and the Scottish Executive should continue.
 - b. Scottish companies only spent half the UK average on R&D. Some multinationals spent too little on research in Scotland and, through the Technology Ventures scheme and otherwise, should be encouraged to do more.
 - c. The Proof of Concept Fund was particularly valuable in bridging the gap between early research and the stage when the results were likely to attract commercial funding. But venture capitalists still tended to be too risk averse, and market uncertainties were extending the proof of concept threshold.
 - d. The ITIs were a potentially significant initiative, particularly if they could attract EU funding. However, it was not clear how they would work and, particularly, how research agendas would be tailored to market needs and national priorities.
 - e. The performance indicators set for Scottish Enterprise tended set too much store by numerical targets (e.g. numbers of jobs or start-up companies created), rather than assessing the value of activities.
 - f. Scottish university knowledge transfer offices were improving their capacity to identify and support research with commercial potential, but IP management was a particularly critical area.
19. Members then met Professor David Gani, SHEFC's Director of Research Strategy and Policy. He made the following main points.
- a. Scottish Enterprise had improved its capacity to evaluate projects and had developed potentially valuable initiatives, such as the Enterprise Fellowship Scheme and the Proof of Concept Fund. But the latter did not cover university overheads which could be a serious obstacle to developing successful R & D.
 - b. University research should be the engine of economic growth. Smaller universities should consider more pooling of research expertise within and beyond Scotland.
 - c. SHEFC had some scope for helping to develop the Third Leg (commercialisation of university expertise), but not all research had economic potential and good academics were not necessarily commercially-minded. Tensions over the relative priority to be given to research, teaching and commercialisation were difficult to resolve.
 - d. Universities should try to develop best practice guidelines for managing IP. Development agencies could help to stimulate this.
 - e. The new ITIs were intended to bridge perceived gaps between Scottish HE and commercial activity. They should be able to provide useful research that smaller companies could not afford. However, it was too soon to say whether the Institutes were being set up on the right lines or being given appropriate funding.
 - f. Some developments had been hampered by the difficulty of disaggregating reliable Scottish data from UK statistics. The Scottish Scientific Research Index should provide a useful database to guide policy.

BIOTECHNOLOGY

20. Finally, members met Dr Barbara Blaney, Director of the recently opened Scottish Office of the BioIndustry Association⁷⁰. She made the following main points.

⁷⁰ BIA Scotland subsequently submitted written evidence to the Inquiry (see page 249 of Volume II).

- a. 430 organisations (including 51 research establishments) in Scotland had been identified as being involved in biotechnology and life sciences. There was great potential in the sector, and the UK had a significant lead. However, sustainability was a critical issue: product development lead times were long and the failure rate was high.
- b. Adequate development finance was hard to come by, especially for smaller businesses. Venture capital tended to be London-based. Scottish Enterprise could play a valuable part in pump-priming biotechnical research, encouraging collaboration and helping to harness research and commercial capacity with longer-term finance.
- c. Most Scottish institutions were still not realising the full potential of their IP. In particular, NHS trusts generally had a lot to learn in this field. More coherent strategies needed to be developed for managing and exploiting that potential.
- d. Scottish Enterprise had consulted widely in the initial preparations for ITIs, but appeared to have drawn up most of the detail in-house. If the potential of the ITIs was to be realised, the wider community should urgently be re-engaged in the initiatives.
- e. HEIs needed to be more responsive to the needs of business. Many researchers were still culturally averse to commercialisation. Some university commercialisation units lacked adequate expertise and tended to reinforce the barriers between researchers and the commercial sector. A priority for Scottish Enterprise was to help engender a more effective approach.

ACKNOWLEDGMENTS

- 21. Members endorsed the Chairman's thanks to Scottish Enterprise, the RSE and all those involved in the various sessions for a valuable insight on the Scottish experience which would greatly assist the Inquiry's consideration of the situation in England.

APPENDIX 6: VISIT TO THE NORTHWEST DEVELOPMENT AGENCY

1. Continuing the first hand observation of how RDAs interacted with their regional partners, members of the Sub-Committee visited NWDA on 11 February 2003. The visit was not to the NWDA's headquarters in Warrington but, to simplify travelling arrangements and by kind invitation of AstraZeneca⁷¹, to the latter's premises at Alderley Park near Macclesfield.
2. The visiting party consisted of Lord Patel (Chairman of the Inquiry), Baroness Finlay of Llandaff, Lord Freeman, Lord Methuen, Lord Mitchell, Lord Oxburgh, Lord Thomas of Macclesfield⁷², Lord Turnberg and Lord Wade of Chorlton. They were supported by the Specialist Adviser to the Inquiry (Dr Marilyn Wedgwood), the Clerk (Mr Roger Morgan) and Assistant Clerk (Mr Gordon Baker).
3. The party was welcomed by Mr John Burrows⁷³, the NWDA's Director of Business Development, and Dr John Stageman⁷⁴, a member of the NorthWest Science Council and Vice-President and Head of Enabling Science and Technology at AstraZeneca.

INTRODUCTORY BRIEFING

4. In an introductory briefing⁷⁵, Mr Burrows made the following main points.
 - a. Before RDAs were set up, the national research agenda lacked a regional dimension and the scientific and economic bases of the English regions had no structured inter-relationship. As a result, research-based universities had not been linked to regional economic priorities, and Government-funded research had been over-concentrated in the South East of England. With the advent of RDAs and their Regional Economic Strategies, the economic role of science and HE was clearly recognised.
 - b. The NWDA's strategy identified 16 target sectors or clusters for economic development. 12 of these (namely: aerospace; chemicals; environmental; renewable and nuclear energy; textiles; biotechnology; digital industries; food and drink; automotive; construction; maritime; and health care) had clear links to science, building on the region's strong academic and industrial research bases. Government-funded scientific research (not least through Daresbury — see paragraph 13 below) was also important in the region.
 - c. Major science-based projects in which NWDA was involved included: the National Biopharmaceutical Manufacturing Facility; the NW Genetics Knowledge Park; InfoLab 21 (Lancaster University's combined research and new business incubator for computing and IT); the National Microsystems Packaging Centre; the National Centre of Excellence in Science & Teaching; an Aerospace Innovation Centre; and a Centre for Environmental Excellence Research and Teaching. NWDA was also providing £2.5 million towards upgrading of the Jodrell Bank radio telescope, and was supporting the merger of Manchester University and UMIST as well as the development of another science park linked to Liverpool University.

⁷¹ Whose Chief Executive, Sir Tom McKillop, chaired the NorthWest Science Council.

⁷² As noted in Appendix 1, Lord Thomas was the Chairman of NWDA from 1998 to 2002.

⁷³ Who conveyed apologies from the NWDA Chief Executive, Mr Mike Shields, that he was unable to be present as planned.

⁷⁴ Who conveyed Sir Tom McKillop's apologies for absence.

⁷⁵ The NWDA subsequently submitted written material to the Inquiry and, on 21 March 2003, also gave oral evidence (see pages 159 and 191 of Volume II).

- d. NWDA had good working relationships with neighbouring RDAs and was ready to collaborate with them on soundly-based joint ventures and joint promotion exercises. Many projects depended on capital or expertise from outside the region.
- e. Financial assistance schemes promoted by NWDA included the North West Equity Fund (which had so far raised £35 million in venture capital) and the Rising Stars Growth Fund (which offered £9.5 million in seed capital for early-stage technology businesses). NWDA also offered advisory and support services, especially for start-up companies in incubator centres.
- f. The current investment climate made it more difficult to finance developments with long-lead times. If the regional economy continued to improve, EU funds seemed likely to become harder to obtain and would, in any case, be stretched by EU enlargement pressures. NWDA was in discussion with DTI about proposals for joint DTI/RDA funding to expand Third Leg commercialisation of research by HEIs.

THE NORTHWEST SCIENCE COUNCIL

- 5. Dr Stageman noted that the NorthWest Science Council⁷⁶, established in 2001, was the first regional science council in England. Membership was drawn from regional leaders of industry, universities and public sector scientific institutions (Daresbury and the NHS), as well as the NWDA. There were close links to the business clusters and to the North West Universities Association.
- 6. The Council was committed to expanding the regional science base and to advocating science and technology as the cornerstone of future regional economic success. It had launched its Science Strategy in December 2002. It had informal, as well as formal, structures for offering independent professional advice to the NWDA on science strategy and tactics. This helped NWDA to produce robust and well-informed action plans. The Council could also stimulate peer review of projects and give added weight and direction to funding proposals.
- 7. Dr David Brown⁷⁷ of Arthur D Little Ltd, consultants to the NWDA, said that the Science Council provided vital underpinning for NWDA's initiatives and the Agency's efforts to promote not only closer working by the regional business and academic communities but also general scientific awareness throughout the region.
- 8. A similar model had been adopted by One NorthEast (NWDA's counterpart in the North East), and other RDAs were also considering forming similar scientific advisory bodies. But Science Councils did not remove the need for RDAs to have a core of professional scientific staff with good links to the regional scientific community and a good understanding of the latest scientific developments.
- 9. Dr Brown also made the following general observations.
 - a. While university research was important, it accounted for only about a third of national R&D spending. R&D spending by the NHS was significant, although over-concentrated in the London area.
 - b. There was not a simple division between SET-related activities that were of either regional or national (and international) significance. World-renowned centres of scientific excellence nevertheless had strong local roots and economic impact.
 - c. Prioritisation was vital: regions, like companies and universities, could not excel at everything. RDAs should avoid spreading resources too thinly. Difficult as it may be, they might have to say "no" more often.

⁷⁶ The NorthWest Science Council subsequently submitted written material to the Inquiry and, on 21 March 2003, also gave oral evidence (see pages 146 and 152 of Volume II).

⁷⁷ Dr Brown subsequently submitted written evidence to the Inquiry (see page 268 of Volume II).

- d. Successful knowledge transfer depended on better understanding and networking between researchers, business and finance. RDAs should help to build bridges and stimulate interaction between them.

HE PERSPECTIVES

10. Over lunch (hosted by NWDA's Chairman, Mr Bryan Gray) the party met representatives of regional universities, members of the NorthWest Science Council and NWDA staff.
11. Professor Michael Harloe, Vice Chancellor of Salford University, made the following main points on behalf of the North West Universities Association⁷⁸, of which he was Chairman.
 - a. The cluster concept was valid, but needed to be flexible in pursuit of long-term winners.
 - b. R&D needed the sustained support of public funding.
 - c. The recent HE White Paper⁷⁹ tended to concentrate too much on too few big universities. It had too static a view of the relationship between business and academic research.
 - d. RDAs needed high calibre staff to appraise projects and mediate between business and academic interests.

GENERAL DISCUSSION

12. The discussion over lunch then turned to more general matters, when the following main points were made.
 - a. Government policy was far too London-centric. Important decisions were still being taken without sufficient thought for or consultation with the regions.
 - b. Whitehall tended to micro-manage the RDAs with over-concentration on short-term targets of questionable relevance. RDAs needed more freedom to pursue longer-term goals and might usefully assist Whitehall in devising more relevant measures for evaluating success.
 - c. RDAs had an important role in turning rhetoric about Third Leg commercialisation of the science based into reality. Part of this would be by bringing together people, ideas and resources to create an enabling environment in which commercially-exploitable scientific research could flourish.
 - d. The exploitation of the science base was too often hampered by complications in managing IPR. RDAs could usefully help universities draw best practice and provide much-needed advice to researchers and entrepreneurs.
 - e. RDAs could do more to promote public awareness and debate about scientific issues and regional capabilities. At the same time, industry leaders should actively promote technological excellence throughout their supply chains.
 - f. Despite advances in IT, physical proximity was still an asset for R&D. However, regional clusters also generally benefited from the stimulus of good external links.
 - g. Substantial sums were available from the EU, but it was time-consuming, complex and costly to pursue them. NWDA's engagement of a specialist to stimulate more EU funding was welcome.

⁷⁸ The North West Universities Association subsequently submitted written evidence to the Inquiry (see page 295 of Volume II).

⁷⁹ *The Future of Higher Education*, Cm 5735, January 2003.

DARESBURY LABORATORY

13. Dr Hywel Price, Director of the Daresbury Laboratory gave an overview presentation of the Laboratory's work. Operating under the Council for the Central Laboratory of the Research Councils (CCLRC), the Laboratory's major facility was the UK's synchrotron source. While it also provided a number of other resources and services of strategic importance for the research community, it — and the region — would be impoverished when the centre of UK synchrotron research transferred to the CCLRC's Rutherford–Appleton Laboratory near Oxford when the successor Diamond Project came on stream in 2008.
14. Because of Daresbury's significance for the region, the NWDA was actively supporting the Laboratory's pursuit of successor facilities and, in conjunction with North West Universities, the development of a Science Park to provide spin-off facilities related to Daresbury projects. 4GLS (the Fourth Generation Light Source) — to which NWDA had pledged a capital contribution of some £4.5 million and had brokered lease-back facilities for the building to house it — was seen as the key project. As described by Professor Peter Weightman of Liverpool University and Professor Wendy Flavell of UMIST, 4GLS was designed to take very fast imaging and spectroscopy beyond the Diamond Project, offering unparalleled advances in biological dynamics, nanoscience and kinetics⁸⁰.
15. Other new projects being pursued at Daresbury were:
 - a. HPCx (a High Performance Computer) — a joint venture with Edinburgh University — described by Dr Martyn Guest as the best large-scale scientific computation facilities in Europe with a wide range of advanced applications; and
 - b. the SuperSTEM project, described by Professor Peter Goodhew as two super-stable high performance scanning transmission electron microscopes providing an invaluable research tool at nanoscale levels.

FORESIGHT

16. Dr Richard Dodds, NWDA's Regional Foresight Director, said that the strong knowledge base of its universities and industries put the region in a strong position to take a lead in developing valuable new technologies in other areas such as waste management, construction industry automation and laser deposition. It could also make an important national contribution to enhancing independent living for the elderly and disabled.
17. NWDA could provide vital seed corn for these developments, through its own budget and by brokering financial packages. It could help to overcome barriers to development, such as lack of affordable premises, patenting expertise and administrative support. Helping with the continued development of the regional skills base was another important task for the NWDA.

ACKNOWLEDGMENTS

18. Members endorsed the Chairman's thanks to the NWDA, the NorthWest Science Council and the participants in the various sessions for an informative and useful day, and also to AstraZeneca for generously hosting the visit.

⁸⁰ On 2 April 2003, NWDA confirmed its investment of £25.7 million to develop Daresbury's Science Park. On the same date, DTI announced the go-ahead for the research, development and design phases of the 4GLS project.

APPENDIX 7: VISIT TO WALES

1. Members of the Sub-Committee visited Wales on 17 February 2003 to see — as for the visit to Scotland (Appendix 5) — how the Welsh Development Agency (WDA) and its partners handled the challenges being faced by the more recently established English RDAs.
2. The visiting party comprised Lord Patel (Chairman), Baroness Finlay of Llandaff, Lord Freeman, Lord Methuen, Lord Oxburgh, Lord Thomas of Macclesfield, Lord Wade of Chorlton and Lord Winston. They were supported by the Specialist Adviser to the Inquiry (Dr. Marilyn Wedgwood), the Clerk (Mr Roger Morgan), Assistant Clerk (Mr Gordon Baker) and the Specialist Assistant to the Select Committee (Dr Jonathan Radcliffe).
3. The party was welcomed to the Agency's Cardiff Headquarters by Mr Roger Jones, the WDA's Chairman. In sketching out the territory covered in greater detail by the following presentations, he emphasised in particular WDA's role as a facilitator and the importance of the Agency's private sector lead in being able to mobilise the various partnerships.

THE POLICY CONTEXT

4. Mr Richard Rossington, the Head of the Innovation Branch of the Welsh Assembly's Economic Development Department, outlined the policy framework for sustainable economic development. This was set out in the Assembly's strategy documents — for the economy, *A Winning Wales* (which laid emphasis on entrepreneurship, innovation and HE) and, for education, *Reaching Higher*.
5. The Assembly, WDA and the HE Funding Council for Wales (HEFCW) had collaborated in producing the Assembly's consultation document *Wales for Innovation*. This identified five key areas for action: communicating what could be achieved through more innovation; developing more high growth potential businesses; better equipping people to innovate; simpler, more effective business innovation support; and maximising the economic development potential of Welsh universities and colleges.
6. Following wide consultation, the final version of this document was due to be published in early March 2003. WDA would be responsible for delivering most of the action plans, through partnerships with Assembly Government Departments and Agencies and Welsh-based businesses, universities and colleges, local authorities, community organisations and trades unions.
7. The WDA Board was appointed by the Assembly's Minister for Economic Development. It was private sector-led and WDA staff were not civil servants. The Assembly set the WDA's annual targets and approved its triennial corporate plan. The plan for 2003–6 was currently being considered. WDA reported twice yearly to the Assembly's Economic Development Committee and was also monitored by the National Audit Office. The WDA's budget for 2002/3 was £345.5 million.

WELSH DEVELOPMENT AGENCY

8. Mr Gareth Hall, WDA's Executive Director for Strategy Development, and Dr Virginia Chambers, WDA's Development Director for Technology and Innovation, gave presentations on the Agency's role in promoting and applying SET⁸¹. They made the following main points.

⁸¹ WDA subsequently submitted written evidence to the Inquiry (see page 341 of Volume II).

- a. Only successful businesses could create prosperity. WDA's role was to identify potential strengths and help to create the conditions which could maximise that potential.
- b. SET was seen as vital to the transformation of the Welsh economy. As traditional industries had declined, WDA had attracted new technology-based industries to Wales. But not enough of those had generated high-value employment or enhanced Welsh research capacity significantly.
- c. It was important to raise the level of Welsh corporate R&D spending. However, most Welsh companies were fairly small (only 23 were listed on the Stock Exchange) and could not afford to commit large sums. More external direct investment, ideally with a substantial Welsh-based R&D content, was therefore desirable. Similarly, although more should be made of Welsh academic research capacity, external expertise and facilities were still indispensable to future growth.
- d. WDA-managed funding for innovation included Smart Wales innovation grants and a Technology Exploitation Grant. WDA had set up a venture capital company, Finance Wales plc. This channelled EU funds and helped to put together syndicated private sector loans. The Wales Innovation Relay Centre, jointly funded by the European Commission and WDA, provided a technical information exchange network with links to similar centres throughout the EU. WDA Innovation and Technology Counsellors advised SMEs on product development and funding.
- e. WDA's Centres of Excellence Programme funded commercial managers in 20 Welsh institutions earmarked for high research standards and commercial potential. University liaison officers provided advice on commercialisation of IP. Specific sector support included the Wales Gene Park (see paragraph 11 below), the Wales Bioscience Programme, the Baglan Energy Park and the proposed St Athan Aerospace Park. Regular Sectoral fora brought together industry leaders and their suppliers to exchange ideas, identify mutual interests and stimulate business opportunities.
- f. Technium Centres — high technology innovation incubators — were an important new initiative. The concept had shown its value in the successful Swansea Technium Centre (see paragraph 12 below). £150 million had now been committed, mainly from EU funds, to expand from the Swansea hub in key subject areas across Wales.
- g. Collaboration with neighbouring English RDAs was growing where there were common interests (for example, with NWDA on aerospace development).
- h. Performance measurement needed to be improved. Success could not be judged satisfactorily by simple measures such as GDP or job creation. WDA was working with Cardiff Business School to develop not only more useful measures but also the data sources to support them.

HE PERSPECTIVES

9. Dr David Grant, Vice Chancellor of the University of Wales, Cardiff, noted that his research-led institution (a member of the Russell Group) contributed to the regeneration of Wales in many direct and indirect ways. Research income had doubled in the last four years, over 60% of it from private sector sources. Graduate and post-graduate numbers were also up. A good proportion of these came from outside Wales, and many wanted to stay in Wales after qualification.
10. WDA had been and would continue to be a valuable partner in developing the opportunities. It helped the university to place research students with industry and to form strategic partnerships with business. It supported specific university-based projects, such as the Cardiff Institute for Tissue Repair and high performance computer centres. It had also been instrumental in setting up the Cardiff University Innovation Network, a

well-regarded and much valued information exchange which now had over 800 business and academic members.

WALES GENE PARK

11. Professor Martin Evans, Director of the Cardiff School of Biosciences and Professor of Mammalian Genetics at the University of Wales, Cardiff, spoke about the Wales Gene Park. In addition to the physical regeneration of part of Cardiff Bay, this would have valuable business and UK-wide scientific consequentials. WDA had helped with seed-corn funding and lobbied Whitehall for UK Government support. It was now considering a feasibility study for the proposed second phase, which would include more scope for spin-off activities. Collaboration with other Welsh universities and the NHS was important to the project.

SWANSEA TECHNIUM CENTRE

12. After a buffet lunch hosted by the WDA's Chief Executive, Mr Graham Hawker, and providing opportunities for informal discussions with a cross-section of Welsh businessmen and academics, the visiting party travelled to the Technium Centre in Swansea. Members were welcomed by Mr Alan Gray, Business Development Director of WDA's South West Division, who outlined the points covered in more detail by the presentations noted below.
13. Mr Andrew Davies AM, the Welsh Assembly Minister for Economic Development, also welcomed the Sub-Committee's visit. He noted that Swansea had been the premier city in the industrial revolution — the first city where more than half had earned their living from industry. Post coal and steel, a massive restructuring of the Welsh economy was needed. WDA had been a vital tool in developing means of exploiting Welsh talent in Wales. The Technium concept was a good illustration of the Agency's innovation. The roll out of Technium Centres was now at the centre of Welsh economic development strategy.
14. In an introductory presentation, Dr Stephen Davies, Director of the Swansea Technium, made the following main points.
 - a. The Technium concept was to provide comprehensive infrastructure and support services in strategic locations for embryonic high-technology business ventures aimed at the knowledge-based economy.
 - b. It had been the brain-child of University of Wales, Swansea and the WDA. The Agency had also acquired and developed the Swansea site. Being in a regeneration area, 50% of the initial funding had been obtained from the EU. WDA had provided 40%, and the rest had come from private sector investors.
 - c. WDA managed the site and provided administrative support and business advice to 20 short-term tenants. These were mainly start-up and spin-off enterprises that were expected to move on as their business grew.
 - d. WDA involvement, staunch university commitment and links to its Centre of Excellence, and support from the local authority and Welsh business had all been critical to the success of the venture. It had already attracted the interest of large corporate investors who were considering locating new premises nearby.
 - e. Construction of Technium II was under way on adjoining site, and the network would be expanded in 20 locations throughout Wales in key cluster-related subjects such as energy, bio, digital, auto and media.

TECHNIUM SECTORAL ACTIVITIES

15. Mr Ian Maxwell, WDA Optoelectronics Sector Manager, illustrated the general concept by considering optoelectronics which WDA had identified as one of the priority growth

sectors for the Welsh economy. The sector already employed over 5,000 people in Wales and had a turnover last year of over £522 million.

16. The OptIC Technium was being built near the North Wales cluster where 40% of UK optoelectronics capacity was located. It would cost nearly £15 million, around £8 million of which was coming from the WDA, and provide incubation facilities for up to 24 small companies.
17. Although the venture was driven by industry, rather than universities, it was linked to the establishment of a Chair in Optoelectronics Materials. WDA had set up the Welsh Optoelectronics Forum to help sustain the project and consolidate Welsh expertise in this field.

HEFCW PERSPECTIVE

18. Mr Roger Carter, Head of Economic Development of the Higher Education Funding Council for Wales (HEFCW), outlined the support for HE and research in Wales. Among the main points he made were the following.
 - a. HEFCW and the National Council for Education and Training in Wales worked together under the brand Education and Learning Wales (ELWa) which, supported by a single secretariat, effectively gave Wales a single post-16 funding body.
 - b. Funding for Third Leg outreach from Welsh HE to the Welsh economy and society was only 1.5% of HEFCW's recurrent funding in 2002-03. However, this was set to grow around priorities to be agreed by ELWa and WDA, and was augmented by a £5m Knowledge Exploitation Fund, equivalent to the English HEIF.
 - c. This was part of a joint determination to improve industry/HE links. By developing HE around centres of excellence, shared aims were that the amount of private sector finance for research and the number of profitable spin-off companies should both be doubled by 2010.
 - d. Welsh society and the economy would also benefit from plans to increase participation in HE, not least by developing seamless progression routes.

TECHNIUM CLIENT CASE-STUDY

19. Finally, Mr Brian Docherty described the benefits of the Technium concept. His company, Small Planet Technology, was a start-up company specialising in telecommunications products. It had been based at the Swansea Technium since March 2001.
20. Technium gave entrepreneurs a high-quality supportive environment to develop technology-based products and processes. The support services on site (including excellent internet and other telecommunications) saved small companies enormous time, frustration and overhead costs. The networking opportunities were also useful, as were the Technium links that encouraged undergraduate and graduate placements.

ACKNOWLEDGMENTS

21. Members endorsed the Chairman's thanks to the WDA and all those involved in the various sessions for a valuable insight on Welsh practice. This would be of great assistance as the Sub-Committee considered the situation in England

APPENDIX 8: VISIT TO THE NORTH EAST

1. Concluding the first-hand observation of how RDAs interacted with their regional partners, on 20 March 2003 members of the Sub-Committee visited ONE, the Regional Development Agency for the North East of England (Durham, Northumberland, Teesside and Tyne & Wear) and the North East Science and Industry Council⁸².
2. The visiting party comprised Lord Patel (Chairman), Lord Freeman, Lord Methuen, Lord Oxburgh and Lord Thomas of Macclesfield. They were supported by the Clerk (Mr Roger Morgan) and Assistant Clerk (Mr Gordon Baker).
3. The party was welcomed to ONE's suite at Newcastle Upon Tyne's International Centre for Life by senior representatives of the Agency and the Science and Industry Council. Before a series of formal presentations, members had informal discussions over a buffet lunch with people from a wide cross-section of regional business and HE interests.

INTRODUCTORY BRIEFING

4. Mr Chris Pywell, Head of ONE's Strategy for Success Team, set the scene by noting that, despite over 70 years of Government intervention, the North East's economy was still under-performing in comparison with the rest of the UK. It had less high added-value employment and lower productivity than most UK regions. New business start-ups had been below the national average.
5. The North East's regional policy was based on mobilising regional potential, locally-driven through the RDA, building on existing strengths and concentrating on developing globally-competitive innovation and entrepreneurship. The strength of the regional SET base was critical to this approach.
6. The North East was starting to turn the corner. A recent independent study had shown that the region had the highest percentage of large enterprises involved in innovation and was second only to the West Midlands for innovation by all enterprises. 36% of North Eastern businesses regarded science as important (compared with a national average of 28%) and the North East was second only to London in new technology start-ups.

REGIONAL STRATEGIES

7. Mr Neil Mundy, Director of Integration at ONE, outlined the Agency's regional strategies, during which he made the following main points.
 - a. ONE's Regional Economic Strategy recognised the importance of bringing the region's HEIs together with business to create a new entrepreneurial culture, raise productivity and improve the skills base.
 - b. This in turn had spawned a strategy for building a knowledge economy in the North East, the *Strategy for Success*. Consultants had helped to identify key regional strengths measured against international business trends and best practice. Science and technology were seen as the main drivers for future economic growth, hence the early establishment of the North East Science and Industry Council (see paragraph 8 below). However, attention had also to be paid to the role of parallel infrastructure developments (such as the transformation of Newcastle's Quayside) to help support SET-based growth.
 - c. The cluster concept inherent to this strategy had to be firmly rooted but dynamic. It was as important to encourage more innovation among existing businesses as it was

⁸² Members stayed in Newcastle the following day, 21 March, for a public meeting at which oral evidence was heard from, among others, ONE and the North East Science and Industry Council (see pages 191 and 152 of Volume II). Both bodies had also submitted written evidence to the Inquiry (see pages 167 and 139 of Volume II).

to stimulate new innovative business ventures. In any case, it was essential to avoid the lower technology investments which had characterised much of past assisted regional development.

- d. ONE had also set up three new regional investment funds and a new facilitating company, NorthSTAR, to offer business development services, especially to help maximize IP, and overcome financing gaps. A partnership programme with Cambridge-MIT would stimulate new research links.
- e. A coherent approach was being developed with the Research Councils, HEFCE and the FRESA. The principles of Foresight should inform the strategy, but needed to be adapted to meet local needs and aspirations.
- f. ONE's role was to act as a catalyst, translating the strategy into action by providing leadership, strategic analysis, practical advice, access to funds and fruitful contacts, and to promote and lobby for the region in the UK and abroad. In doing so, it explored possibilities for mutually beneficial collaboration with other RDAs through networking at various levels which also helped avoid needless competition and duplication.
- g. The Agency's strengths lay in the local knowledge, contacts and commitment of a Board and staff with solid business experience and independence from Government.

NORTH EAST SCIENCE & INDUSTRY COUNCIL

- 8. Mr Pywell spoke about the North East Science & Industry Council, making the main points as below.
 - a. The Science and Industry Council had been set up at an early stage to provide independent guidance in developing the strategy. Its title explicitly recognised ONE's and the Region's need for expert industrial as well as scientific advice. That balance was also reflected in its distinguished membership.
 - b. The Council had brought together a wide range of expertise from people committed to the region, and had played a crucial part in developing the regional strategy. By common consent, it had a central role in helping to steer the region's regeneration.
 - c. To help provide a focus for future developments, centres of excellence were being established in particular fields where the region had world-class potential, namely: new and renewable energy; life sciences; nanotechnology, photonics and microsystems; digital and media technology; and process industries. By creating critical mass in these key areas, the centres of excellence would build on the existing industry clusters and university research, help pull in additional investment, and generally fast-track the most advantageous developments.
 - d. The centres were new models of public/private development — companies limited by guarantee, with their own independent boards and freedom to pursue their objective of sustainability. Five Chief Executives, of international standing, had been recruited to run the companies.
 - e. The Council would provide overall long-term vision as well as key sectoral expertise. This would help to keep ONE abreast of significant scientific, industrial and policy developments and ensure that the assumptions on which the strategy was founded remained valid. It would also monitor the implementation of the strategy, act as a champion in promoting it, and use members' contacts and influence to foster creative partnerships and support networks.

REGIONAL UNIVERSITIES

- 9. Professor John Goddard, the Deputy Vice-Chancellor and Professor of Regional Studies of the University of Newcastle, gave a presentation on the Universities' perspective. Among his main points were the following.

- a. Universities wanted to be located in a vibrant forward-looking region, not least to help them attract talented staff and students and expand their own research base.
- b. They were significant contributors to the regional economy and increasingly aware of their local civic and social responsibilities, including the needs of the local labour market and demands for life-long learning and access to high-quality local academic institutions.
- c. Too much publicly-funded research was concentrated in the South of England. The proposals in the recent HE White Paper could have the perverse effect of exacerbating this geographical imbalance and hampering the growth of Third Leg activities. North East universities were countering this by working, with ONE's support, to build critical mass through intra- and inter-institutional collaboration.
- d. It was important to avoid wasteful "turf wars" between universities, as it was between regions. ONE and the Science and Industry Council had helped to bring HE and business together in a coherent regional strategy. This, and other RDAs' efforts, should feed into a joined-up national SET policy involving Whitehall Departments, the Research Councils and HEFCE.

THE INTERNATIONAL CENTRE FOR LIFE

10. The above events were, as noted, held at the International Centre For Life. The Centre's Chief Executive, Alastair Balls, explained that it had brought together a probably unique mix of science and biotechnology, research and education, entertainment and ethics, all on a single site. Built at a cost of some £70m (raised from the Millennium Commission, the EU and the private sector) and opened in 2000, it had developed into a flagship UK location for exploring genetic science and was a vital part of the underpinning for ONE's centre of excellence in life sciences.
11. One of the site's recent arrivals was Xcellsyz, a company using cell-based technologies for drug discovery. Xcellsyz had been spun out of a collaboration between the University of Newcastle, the University of Barcelona and University College, London. Mr Brad Hoy, the CEO, outlined the benefits of ONE's support and co-location with other research activities on the site. Dr Rez Halse, Xcellsyz's Head of Cell Biology, showed members round the company's state of the art facilities.
12. Members also visited the Centre's public exhibition, where they were shown round by Ms Linda Conlon, the Director. Joined by Mr Noel Jackson, the Centre's Education Manager, they also toured the associated school science education facilities.

ACKNOWLEDGEMENTS

13. The day ended with a dinner kindly hosted by ONE and the Science and Industry Council. This enabled the visiting party to continue informal discussions with leading figures from the host bodies and the region's business and academic communities.
14. Members endorsed the Chairman's thanks to ONE, the North East Science and Industry Council and the participants in the various sessions for an informative day which would be of great assistance to the work of the Inquiry.

APPENDIX 9: ABBREVIATIONS

AIRTO	Association of Independent Research and Technology Organisations
AURIL	Association for University Research and Industry Links
AWM	Advantage West Midlands (RDA for the West Midlands)
CCLRC	Council for the Central Laboratory of the Research Councils
DCMS	Department of Culture Media and Sport
DEFRA	Department for Environment, Food and Rural Affairs
DfES	Department for Education and Skills
DTI	Department of Trade and Industry
CBI	Confederation of British Industry
CURDS	Centre for Urban and Regional Development Studies, University of Newcastle
EEDA	East of England Development Agency
ELWa	Education and Learning Wales
EPSRC	Engineering and Physical Science Research Council
EMDA	East Midlands Development Agency
EU	European Union
FRESA	Framework for Regional Education and Skills Action
GDP	Gross Domestic Product
HE / HEIs	Higher Education / HE Institutions (generally interchangeable with "universities")
HE-BIS	Higher Education — Business Interaction Survey
HEFCE	Higher Education Funding Council for England
HEFCW	Higher Education Funding Council for Wales
HEIF	Higher Education Innovation Fund
HEROBAC	Higher Education Reach Out to Business and Commerce
IoD	Institute of Directors
IoP	Institute of Physics
IP / IPR	Intellectual Property / IP Rights
ISLI	Institute for System Level Integration, Livingston
IT	Information Technology
ITI	Intermediate Technology Institutes
LDA	London Development Agency
NHS	National Health Service
NWDA	NorthWest Development Agency
ODPM	Office of the Deputy Prime Minister
ONE	One NorthEast (RDA for the North East)
OST	Office of Science and Technology

RDAs	Regional Development Agencies (including the LDA, unless otherwise indicated)
RAE	Research Assessment Exercise
R&D	Research and Development
RSE	The Royal Society of Edinburgh
SBS	Small Business Service
SET	Science, Engineering and Technology
SEEDA	South East of England Development Agency
SHEFC	Scottish Higher Education Funding Council
SMART	Small Firms Merit Award for Research and Technology
SMEs	Small and Medium-sized Enterprises
SURF	Centre for Sustainable Regional Futures, University of Salford
SWRDA	South West Regional Development Agency
TQA	Teaching Quality Assessment
UNICO	The Universities Companies Association
UUK	Universities UK (the successor to the CVCP — Committee of Vice-Chancellors and Principals)
WDA	Welsh Development Agency
YF	Yorkshire Forward (RDA for Yorkshire and Humberside)

ISBN

0-10-442472-9
The new International Standard Book Number that identifies
books.

Author

Ronald H. Smith

Title

Business Environment

Editor

The Blackie Library of Reference

Series

Study Business Series

Publisher

Blackie, Publishing and Teaching

Address

Blackie Ltd., London E14 8JL, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England

Address

Blackie Ltd., 1000 London Road, Cheltenham, Gloucestershire GL50 2JG, England



ISBN 0-10-442472-9

9 780104 424728

Distributed by TSO (The Stationery Office)

and available from:

TSO

(Mail, telephone and fax orders only)

PO Box 29, Norwich NR3 1GN

General enquiries 0870 600 5522

Order through the Parliamentary Hotline *Lo-call* 0845 7 023474

Fax orders 0870 600 5533

Email book.orders@tso.co.uk

Internet <http://www.tso.co.uk/bookshop>

TSO Shops

123 Kingsway, London WC2B 6PQ

020 7242 6393 Fax 020 7242 6394

68–69 Bull Street, Birmingham B4 6AD

0121 236 9696 Fax 0121 236 9699

9–21 Princess Street, Manchester M60 8AS

0161 834 7201 Fax 0161 833 0634

16 Arthur Street, Belfast BT1 4GD

028 9023 8451 Fax 028 9023 5401

18–19 High Street, Cardiff CF1 2BZ

029 2039 5548 Fax 029 2038 4347

71 Lothian Road, Edinburgh EH3 9AZ

0870 606 5566 Fax 0870 606 5588

The Parliamentary Bookshop

12 Bridge Street, Parliament Square

London SW1A 2JX

Telephone orders 020 7219 3890

General enquiries 020 7219 3890

Fax orders 020 7219 3866

Accredited Agents

(see Yellow Pages)

and through good booksellers

© Parliamentary Copyright House of Lords 2003

Applications for reproduction should be made in writing to The Licensing Division,

HMSO, St Clements House, 2–16 Colegate, Norwich NR3 1BQ

— Fax 01603 723000

ISBN 0 10 442472 9